IMPERIAL MYCOLOGICAL INSTITUTE

REVIEW
OF
APPLIED MYCOLOGY

VOL. XIX JULY 1940

ROLAND (G.). **Bijdrage tot de kennis der virusziekten der Spinazie.** [Contributions to the knowledge of the virus diseases of Spinach.] —*Tijdschr. PlZiekt.*, xlv, 6, pp. 260–274, 2 pl., 1939. [French summary.]

A full account is given of the writer's studies at the Wageningen (Holland) Mycological Laboratory on spinach yellows and mosaic. The first disease is caused by the virus of beet yellows [*R.A.M.*, xix, p. 185] and the second by a virus of the cucumber 1 type [ibid., xviii, p. 647; xix, p. 186]. Both diseases are transmissible by *Myzus persicae* from infected to healthy spinach plants, yellows also being communicable from spinach to beet by this means; mosaic, but not yellows, can further be conveyed from plant to plant by grafting. The identity of mosaic with the American 'spinach blight', assumed by German workers [ibid., ix, p. 428], is not accepted on the grounds that the inoculation of tomato, *Datura stramonium*, and *Amaranthus retroflexus* gave positive results in the case of spinach blight and negative in that of mosaic.

Plants infected by either virus in the field are more or less chlorotic, the yellowing originating mainly between the veins of the outer leaves, the blades of which are curled, thickened, brittle, and turn blue on the application of Sachs's stain. The secondary phloem of the affected foliage shows gumming. In severe cases the heart leaves cease to grow and finally turn yellow, by which time the outer foliage has become so shrivelled that nothing remains but a rosette of small, yellowish, undeveloped leaves. Finally the whole plant dies.

In the greenhouse the symptoms of spinach mosaic on spinach, beet, cucumber, tobacco, and *Nicotiana glutinosa* are as follows. On spinach the parenchyma between the veins of the heart and middle leaves is discoloured. The network of the veins, even the very finest, stands out green in relief against the yellowish tissue of the lamina. The heart leaves are sometimes rolled. The chlorosis eventually reaches the outer leaves, which may sustain heavier damage than the younger ones. The blades of the young leaves may be distorted by a slight arching of the interveinal tissues.

On beet the young leaves show pale green, irregular spots, up to 0·5 cm. in diameter, becoming confluent and involving a more or less extensive area of the surface. Diseased plants are stunted, and the interveinal tissues of the young leaves sometimes arched.

The progress of the disease on cucumber is very swift and may be fatal. The young and middle leaves are soon quite yellow, and the growth of the plants is greatly retarded or entirely checked. The yellow lesions may assume the shape of rings.

On tobacco the symptoms are not always very conspicuous; they consist of a more or less acute chlorosis of the middle leaves, sometimes uniformly distributed over the surface and in other cases confined to the veins or the interveinal spaces. The leaf blades are often arched near the tip, at the site of the junction of the secondary veins.

On *N. glutinosa* the virus caused a pale spotting of the young foliage.

SOYER (Mme D.). **La 'rosette' de l'Arachide. Recherches sur les vecteurs possibles de la maladie.** [Groundnut rosette. Researches on the possible vectors of the disease.]—*Publ. Inst. nat. Étud. agron. Congo Belge*, Sér. sci., 21, 23 pp., 2 col. pl., 5 figs., 1939. 11 fr.

Both the ordinary chlorotic and the green type of groundnut rosette [*R.A.M.*, xii, p. 5; xvii, p. 582; xviii, pp. 434, 652] are found in the Belgian Congo. Attempts at transmission by sap inoculation, by growing the plants in supposedly infected soil, and by the use of seed from infected plants gave negative results; the disease was, however, successfully transmitted by grafting and by the insect *Aphis laburni*. Of a number of different plants growing in waste patches and harbouring *A. laburni* only *Centrosema plumieri* developed mosaic symptoms when infectious individuals of *A. laburni* were fed on it; it was not found possible to re-transmit the disease from *C. plumieri* to groundnut. At Gandajika losses from the disease may reach up to 90 per cent. of the crop. Creeping varieties are more susceptible than erect ones, and the second-season crops are more severely affected than the first. Thick sowing reduces the spread of the disease. Control methods consist in sowing the plants very thickly, the retardation of weeding, not growing two consecutive crops of groundnuts in the same plot, destroying the plants that arise from pods left in the ground, and the use of resistant varieties.

MONTEMARTINI (L.). **Un altro triennio (1937-39) di osservazioni sopra le malattie ed i parassiti delle piante coltivate nella Sicilia occidentale.** [A further three years (1937–39) of observations on diseases and parasites of plants grown in western Sicily.]—*Riv. Pat. veg.*, xxx, 1–2, pp. 1–28, 1940.

This report on plant diseases in western Sicily [cf. *R.A.M.*, xvi, p. 230] during 1937 to 1939, inclusive, contains, *inter alia*, the following items of interest. Plums were attacked by *Bacterium pruni* [cf. ibid., xiii, p. 562] and *Rhus coriaria* plants by *Exoascus* [*Taphrina*] *purpurascens*. The Perfection tomato variety showed symptoms of 'fern-leaf', a condition which so far has not been common in Italy [ibid., xvi, p. 641]. *Quercus ilex* trees planted in the place of wilting *Ficus magnolioides* developed severe infection by *Phyllosticta quercus ilicis*. The aecidial stage of *Melampsora rostrupii* [ibid., xv, p. 618] was commonly present on *Mercurialis annua*.

Servazzi (O.). **Appunti di fitopatologia.** [Phytopathological notes.]—*Boll. Lab. sper. R. Oss. Fitopat. Torino*, xvi, 1–4, pp. 19–32, 1 pl., 1939 (issued 1940).

In 1938 the author observed *Pestalozzia guepini* [*R.A.M.*, x, p. 705; xi, p. 377] on the leaves of *Camellia japonica* at Turin. *Monochaetia compta* [of which a list of eight synonyms is given] was found on branches of cultivated roses in three localities. The author's observations show that the fungus grows as a saprophyte on sickly leaves and dried-up branches of roses, but is able to spread, on weakened hosts, to living leaves and branches. It was also found in association with *Coniothyrium wernsdorffiae* and *Hendersonia rosae*.

Cowpeas of American origin grown in Piedmont showed a condition apparently identical with that associated in Arizona with *Alternaria atrans* [ibid., ii, p. 250]. The 4- to 5-septate conidiophores, generally arranged in groups of 5 or 6 or more, measured 50 to 100 (occasionally up to 200) by 5 to 10 μ, and the [ob-]clavate, brown conidia with 5 to 10 transverse and 2 to 3 longitudinal septa measured 35 to 110 by 11 to 25 μ, and were frequently found in chains of 2 to 6. The disease appeared to follow aphid attack.

Owing to intensely cold weather spring defoliation of poplars due to *Pollaccia elegans* [ibid., xviii, p. 639] did not occur in any locality in 1939, though light leaf infections were found. The Sphaeropsid fungus (the correct name for which the author considers is *Phoma populina* (Vuill.) Sacc.) [ibid., xix, p. 51] was not observed. On withered shoots the author found the fungus he formerly identified as *Didymosphaeria populina*, but the correct name of which he considers is *Venturia populina* [loc. cit.]. This fungus was also obtained in culture from isolations of *Pollaccia elegans*. In the spring of 1939 it was found on trees observed to be infected the year before, the perithecia evidently having developed on shoots affected in 1938; other perithecia found in the summer of 1939 originated from infections occurring in the spring of the same year. *P. radiosa* (*V. tremulae*) [loc. cit.] was found on *Populus alba* and on a self-sown poplar, probably a hybrid of *P. alba* and *P. tremula*. On *P. alba* the fungus produced spots identical with those seen on *P. tremula* and *P. canescens* (a hybrid of *P. alba* and *P. tremula*). The uniseptate, almost piriform, light yellow-olivaceous conidia averaged 30 to 32 by 6 to 8 μ, and resembled those of the fungus described by Saccardo as *Clasterosporium asteroma* var. *macrosporum* on leaves of *P. alba*.

Chrysanthemums near Turin wilted and died as a result of attack by *Fusarium dianthi* [ibid., xii, p. 677]; there was evidence of marked varietal differences in susceptibility.

Plant diseases. Notes contributed by the Biological Branch.—*Agric. Gaz. N.S.W.*, li, 1, pp. 15–19, 4 figs.; 3, pp. 155–159, 6 figs., 1940.

Heavy rains during November, 1939, in several wheat-growing areas in New South Wales stimulated extensive development of stem rust [*Puccinia graminis*] on crops already sappy and succulent from moist conditions prevalent earlier in the season, with resulting reductions in yield of 25 per cent. in some cases, as well as depreciated grain quality.

Many crops also showed extensive lodging, due, almost invariably, to frost damage in August and September. The Ford variety, in contrast to Dundee, was markedly resistant to rust [*R.A.M.*, xviii, p. 656]; Bencubbin showed some resistance in the south-west.

Very serious losses to the citrus crop in the Murrumbidgee irrigation area and near the Murray River were caused by *Septoria citricola* [ibid., xvii, p. 742]. Navel oranges showed the most severe infection, but heavy losses were also sustained by Valencia oranges, grapefruit, and lemons. Losses of upward of 50 per cent. of the Navel orange crop occurred generally in the Barooga area, and similar losses were experienced on about one farm in fifteen at Griffith and one in five at Leeton. The disease does not occur in coastal areas.

Grapes nearing maturity are sometimes attacked by ripe rot (*Gloeosporium fructigenum*) [*Glomerella cingulata*: ibid., xvii, p. 726], infection being favoured by insect punctures, wet weather during ripening, and mechanical injuries.

Big bud disease of tomato [ibid., xiii, p. 62] is stated to have appeared on several crops and caused substantial losses. The only method of control considered worth while is that of removing and destroying the affected plants as soon as the disease appears.

Brown patch, attributed to the soil-borne fungi *Rhizoctonia* and *Helminthosporium* [cf. ibid., xvi, p. 468], is the most common disease of home lawns and sports turf in New South Wales. It may, however, be satisfactorily controlled by mercuric chloride-mercurous chloride treatment. An alternative chemical mixture, developed by H. A. J. Pittman, consists of copper sulphate and potassium permanganate (2 oz. of the former and 1 oz. of the latter in 4 gals., the mixture being stirred thoroughly). The affected lawns are first watered by means of sprinklers and when the moisture has drained away, the solution is applied at the rate of 1 gal. per sq. yd., the chemicals being then washed away by water sprinklers to avoid scorching.

Department of Plant Pathology.—*Rep. Del. agric. Exp. Sta., 1938-9* (*Bull.* 220), pp. 33–40, 1939.

This report on plant disease work in Delaware in 1938–9 [cf. *R.A.M.*, xviii, p. 376] contains, among others, the following items of interest. T. F. Manns states that evidence obtained locally demonstrates that plum trees are the chief factor in the spread of peach yellows and little peach. It was also found that *Philaenus leucophthalmus* gave an even higher incidence of yellows infection in limited experimental work than *Macropsis trimaculata*. When the former was fed on virulent yellows and transferred to large peach trees in cages, four trees developed infection, though the controls remained healthy.

The most successful treatments (sprout dip) against *Fusarium* wilt of sweet potato [*F. oxysporum* f. 2 and *F. bulbigenum* var. *batatas*] were improved semesan bel (1 lb. in 10 gals.), mercuric chloride (1 oz. in 8 to 10 gals.), Bordeaux mixture 10–10–50, and a finely divided copper oxide (yellow) carrying a disbursing agent, and used at the rate of 1·2 lb. per 50 gals. In 1938 the last-named material caused less inhibition of growth than the others. In 1936 the controls averaged 64 per cent. wilt, several of the treatments giving only 4 to 5 per cent. wilt; in

1938 the controls averaged 24·8 per cent. wilt, and the better treatments 10·2 to 10·9 per cent.; in 1937 increases [? of yield] due to the treatments ranged from 20·6 to 53·8 per cent.

T. F. Manns and S. L. Hopperstead found that, through greenhouse culture under dry conditions, bacterial leaf spot (*Bacterium pruni*) of peach [ibid., xviii, p. 788] is completely controllable in one season. By this method the disease can be eliminated from nursery stock destined for budding. Using an arid region to eliminate *Bact. pruni* and scab [*Cladosporium carpophilum*: ibid., xviii, p. 785], 30 peach strains were sent to the Yakima district in the early spring of 1937, and grown for one season. In the spring of 1938 the same strains were sent back to Delaware and isolated for a budding source free from *Bact. pruni*. Several years' observations on peach seedlings used for budding indicated that infection by *Bact. pruni* does not come in on the pits or through the wild peach stock; nursery stock is infected directly from the bud used in budding. Locally, bud infection is usually highest in August, when most of the budding is being carried out. The terminal buds are mainly responsible for carrying the disease over in the nursery and in the orchard.

K. J. Kadow, M. W. Goodwin, and S. L. Hopperstead, working in collaboration with the Tobacco By-Products Company, Richmond, Virginia, and the Entomological Department of Delaware University on the interrelation of copper sprays with lead arsenate-lime and fixed nicotines, found that none of the copper fungicides tested can be safely used with fixed nicotine and oil except when lime is added. Fixed nicotines greatly increase the solubility of the insoluble coppers. All the insoluble copper sprays tested with lead arsenate and lime were inferior to Bordeaux mixture for the control of arsenical injury, but caused much less fruit injury and copper leaf burn than Bordeaux mixture.

SMITH (C. O.). **Susceptibility of species of Cupressaceae to crown gall as determined by artificial inoculation.**—*J. agric. Res.*, lix, 12, pp. 919–925, 4 figs., 1939. [Received April, 1940.]

In this paper the author records the results of inoculation experiments in California with *Bacterium tumefaciens* on species of Cupressaceae. Cultures from peach produced galls on *Cupressus*, *Juniperus*, and *Thuja* spp., others from *Salix* sp. produced galls on *Cupressus*, *Thujopsis*, *Juniperus*, and *Thuja* spp., and those from *Libocedrus decurrens* [*R.A.M.*, xvii, pp. 19, 447] gave negative results on all except the original host species. Sixteen species of *Cupressus* were found to be definitely susceptible, viz., *C. arizonica*, *C. bakeri*, *C. benthami*, *C. duttoni*, *C. forbesii*, *C. goveniana*, *C. lusitanica*, *C. knightiana*, *C. macrocarpa*, *C. macnabiana*, *C. nevadensis*, *C. pygmaea*, *C. sargentii*, *C. sempervirens*, *C. thurifera*, and *C. torulosa*. Knob-like growths but no typical galls were produced on *C. glabra* and *C. montana*, and on *C. guadalupensis* all the inoculations gave negative results. Galls were produced on *J. virginiana*, *J. phoenica*, and *J. procera*, but only small, knob-like growths on *J. hibernica* and *J. cedrus*. *L. decurrens*, *Thuja plicata*, *T. occidentalis*, and *T. orientalis* gave ready response. Inoculations of *Thujopsis dolabrata* yielded no infection, but rooted cuttings of this species were

susceptible. *Chamaecyparis lawsoniana* developed non-typical overgrowths.

PASSALACQUA (T.). **Due nuove matrici del Bacterium tumefaciens.** [Two new hosts of *Bacterium tumefaciens*.]—*Lav. Ist. bot. Palermo*, x, 1, pp. 42–46, 2 figs., 1939.

Of a number of ornamentals inoculated at the Milan Serotherapeutical Institute with pure cultures of *Bacterium tumefaciens*, only *Ficus bennettii* and *F. bellengeri* became infected, developing small tumours after a protracted incubation period.

VOELCKER (O. J.) & WEST (J.). **Cacao die-back.**—*Trop. Agriculture, Trin.*, xvii, 2, pp. 27–31, 6 figs., 2 maps, 1940.

This is a report on the authors' investigations into die-back [*R.A.M.*, xvii, p. 224], and dying-out [ibid., xiii, p. 222] of cacao in Nigeria and during a tour through the Gold Coast. In Nigeria, where cacao cultivation is almost entirely confined to the south-western provinces, the following three primary factors are believed to cause die-back: (i) drought, which causes a slow die-back of twigs and branches in trees of all ages, while the leaves wilt, turn yellow, and fall off; (ii) blast, caused by *Sahlbergella* spp.; and (iii) unsuitable soil producing a general debility of growth. Summing up the theories put forward for the cause of die-back in Nigeria, the Gold Coast, Trinidad, and Grenada, the following would appear to be the possible factors: lack of soil moisture during the dry season; excess of soil moisture at certain periods; lack of manure and forking; unsuitability of the soil; and *Sahlbergella* blast. A form of dying-out of cacao, which is distinct from die-back, is stated to be known under the general term 'exposure' in nearly all cacao-growing countries, the possible causes being exposure, soil deterioration, lessening of soil moisture, direct solar effect, further action of the agent causing the original break in the canopy, and ingress of insects. The authors' own observations in the Gold Coast [a detailed account of which is given in an appendix] pointed to the existence of two distinct sets of conditions under which die-back occurs: (i) dry areas with generally less than 55 in. of rainfall, in which the symptoms in both cacao and the secondary vegetation were identical with those associated in Nigeria with drought and in which, with the exception of one heavily shaded farm in a valley, no sign of *Sahlbergella* damage was found; and (ii) wet areas with generally over 55 and mostly over 60 in. of rainfall, in which soil moisture was abundant and *S.* spp. were present on the shoots. It was not established whether other insects apart from *S.* spp. were involved, but the authors are convinced that insect attack was responsible for the actual killing-back of the cacao in the wet areas. It is concluded that die-back in Nigeria is due to three primary causes: drought and lack of soil moisture during dry seasons; blast caused by *S.* spp. associated with wet conditions; and unsuitability of the soil. In the Gold Coast two primary causes seem to be responsible: drought in the dry, and *S.* spp. in the wet areas. Since several factors appear to be responsible for die-back, it would seem that a single control measure could hardly be effective in every case.

Pound (F. J.). **Search for resistance to witchbroom in Cocoa.**—*Proc. agric. Soc. Trin. Tob.*, xl, 1, pp. 35, 37, 1940.

Seeds from cacao trees found in the upper regions of the Amazon and in Ecuador apparently uninfected by witches' broom [*Marasmius perniciosus*: *R.A.M.*, xix, p. 266] were sent to Trinidad, quarantined in Barbados, and then retransferred to Trinidad as budwood for grafting on to local stocks. Of the introductions, some from Ecuador have been at the Marper Estate for over a year; more than 50 per cent. are infected, some severely, others lightly, but many are still healthy. Some of the selected local clones [ibid., xvii, p. 729; xix, p. 261] at Marper have been planted out for two years; most have shown some resistance, and one or two have developed scarcely any infection, though already fruiting.

Mourashkinsky (K. E.). Защита хлебов от болезней в засушливых районах юго-востока. [Control of cereal diseases in the arid districts of the south-east.]—*Омская Область* [*Omsk District*], *1940*, 2, pp. 31–36, 1940.

Discussing the control of diseases of cereal crops under conditions of south-eastern U.S.S.R., the author points out that the arid character of this area is erroneously believed by many to be so unfavourable for disease development that control measures have been relaxed. During 1936 some farms in a district with an average precipitation of 242 mm. showed from 30 to 50 per cent. wheat bunt [*Tilletia caries* and *T. foetens*]. Serious losses are also occasioned by loose smut of wheat [*Ustilago tritici*]. Plants grown from vernalized seeds treated with preparation AB [*R.A.M.*, xv, pp. 785, 788; xix, p. 321] showed a very high rate of infection with bunt on several farms in the area. This chemical should, therefore, not be used in dry districts. Ergot [*Claviceps purpurea*] is prevalent on rye only in some years. It seems that the most widespread form of this disease in zones of desiccation is one in which no sclerotia are formed, the development of the fungus being arrested at the 'honey-dew' stage. Although there is usually a lower incidence of rust than in more humid areas, it is more destructive under arid conditions. Brown rust of wheat (*Puccinia triticina*) is capable of overwintering in the field in spite of adverse conditions and represents a serious cause of infection in summer. Of some importance in dry regions is the seedling wilt of cereal crops caused usually by *Helminthosporium sativum*, or by other *H.* and *Fusarium* spp. The 'pupation' disease [ibid., xix, p. 337] of cereals, which is undoubtedly of Asiatic origin, has not yet been observed in the arid south-east, but is apparently spreading westwards and has already passed the Urals.

Jones (G. H.) & Seif El-Nasr (A. El-G.). **The influence of sowing depth and moisture on smut diseases, and the prospects of a new method of control.**—*Ann. appl. Biol.*, xxvii, 1, pp. 35–57, 11 graphs, 1940.

Further experiments on the effect of planting method on flag smut of wheat [*Urocystis tritici*], wheat bunt (*Tilletia foetens*), covered smut of barley (*Ustilago hordei*), and grain smut (*Sphacelotheca sorghi*) of millet [sorghum] and a millet variety called broomcorn [*R.A.M.*, xviii,

p. 170] again showed the superiority of the afir method. The main difference between the afir and the herati method consists in the following: afir plots, being irrigated immediately after sowing, are wet, and the seed is buried about 4 cm. deep; in herati plots the soil is only moist enough for good ploughing, and the seed is buried with a plough set at 12 to 15 cm. deep, the average depth of seed effectively planted being about 8 cm. The effect of the planting methods on the incidence of smuts was found to be conditioned by two factors, depth of sowing and soil moisture. It is suggested that the marked influence of the first factor is probably due to lengthening of the period in which the seedling is susceptible to infection by deeper planting. A series of theoretical curves of infection plotted against depth of planting (both for the case of solely seed-borne smuts and the complex case of seed and soil inoculum) were drawn on this assumption and proved similar in some degree to the actual curves of observed disease. The influence of wet soil is unfavourable to disease but less marked than that of depth of planting, except perhaps for flag smut, where it is unusually important. The soil moisture effect is very consistent for all diseases and at all depths, and increases with depth, presumably owing to lack of aeration. Under extreme conditions the soil moisture effect becomes so great that it apparently reverses the effect of depth. This is tentatively explained by the fungus becoming destructively parasitic and killing the seedlings in the early stages of infection, before their emergence. This effect is most marked in bunt of wheat and grain smut of broomcorn.

On the basis of these results shallow planting in wet soil is generally recommended for countries where irrigation is practised. Good control of smut diseases was obtained with mud-sowing, a method consisting in broadcasting the seed on the surface of recently flooded land, either previously dry or moist. The results of comparative experiments showed 0·08 to 0·2 per cent. of flag smut in mud-sown plots as compared with 2·4 to 3·2 in the afir, and 8·1 to 8·6 in the herati plots. Limited experience indicates that on heavy soils in most parts of Egypt mud-sowing is practicable and satisfactory, but on other soils new methods should be tried. In the control of grain smut of millet and broomcorn, seed treatment with sulphur is considered so cheap and simple a method, that no other need be sought. On the other hand, no satisfactory disinfectant being yet available against bunt and flag smut of wheat, the best means of control is the application of special planting methods.

Jones (G. H.) & Seif el-Nasr (A. El.-G.). **Control of smut diseases in Egypt with special reference to sowing depth and soil moisture.**— *Bull. Minist. Agric. Egypt* 224, 46 pp., 7 pl., 12 graphs, 1940.

Much of the subject matter dealt with in this bulletin on the control of flag smut of wheat (*Urocystis tritici*), covered smut of barley (*Ustilago hordei*), wheat bunt (*Tilletia foetens*) and grain smut (*Sphacelotheca sorghi*) of sorghum and broomcorn has already been noticed from another source [see preceding abstract]. The mud-sowing method is stated to have the further advantage of inducing excellent germination and early tillering, which probably improves quality and uniformity of grain. There is, however, a danger that under conditions of abnormally rapid surface drying seeds may fail to penetrate the hard soil and

consequently produce poor stands. To prevent this seeds can be coated with mud before sowing in order to make them heavier and thus more capable of penetrating the soil surface and to enable them to absorb more water by fusion of the coating with the soil. In small-scale experiments the following stand figures were obtained for wheat and barley, respectively: dry seed sown on mud, 215 and 90 plants per sq. m., dry seed mud-coated, 386 and 218. Still better results were obtained with seed soaked for 24 hours and then mud-coated (440 and 430 plants per sq. m.), but most farmers consider soaking of seed objectionable. A modified herati method is also described in which the land is deeply ploughed and allowed to lie for five days and the seeds then broadcast and passed over once or twice with a light zahhafa (a wooden baulk), so that they are covered to a depth of 1 to 2 cm.

In an appendix the flag smut [*R.A.M.*, xvi, p. 167] situation in Egypt is surveyed. The disease is stated to be rather uncommon near the Mediterranean coast and in the south at Assiut, but is most serious near the centre of the Delta. The amount of disease in the field varies greatly with the season; the highest figure ever recorded was 58 per cent., but the normal yearly average is very much lower. The presence of 50 per cent. disease in the field is likely to cause a loss of about 20 per cent. in yield. Seed disinfection has not yet given very clear-cut results in Egypt; the best were obtained with copper sulphate dip, which controlled on the average about 30 per cent. infection in herati and about 50 per cent. in afir plots, but frequently depressed the germination in the former. It is thought probable that all Egyptian soil is infected. The results of two large experiments with burning of stubble were insignificant. Phosphate manuring had no effect on the disease.

A second appendix deals with curious abnormalities and twistings observed in barley seedlings grown from dehulled seed. It is shown that this effect was associated with the failure of coleoptiles to burst at the apex, bursting instead at the base. This is probably due to a very rapid intake of water in dehulled seeds and some disorder of the growth system which prevents proper growth of the coleoptile but not of the green shoot within, so that the pressure is abnormally great and often bursts the coleoptile at the base. The addition of 0·25, 0·5, or 1·5 per cent. hortomone (a growth substance) to the seedlings improved the growth of roots and coleoptiles. On the basis of these results it is suggested that the increased susceptibility to smut in dehulled seed observed by other workers [ibid., iv, p. 214] may be due to the longer period of emergence of seedlings, and is a consequence rather than the cause of twisting and other abnormalities of growth.

Boewe (G. H.). **Diseases of small grain crops in Illinois.**—*Circ. Ill. nat. Hist. Surv.* 35, pp. v+130, 1 pl., 47 figs., 1939. [Abs. in *Exp. Sta. Rec.*, lxxxii, 4, p. 501, 1940.]

The six chapters of this monograph deal, respectively, with the nature of cereal, wheat, oats, barley, and rye diseases, and their control. All the important diseases affecting small grains in Illinois are illustrated from photographs and described in detail, with notes on the life-history of the causal organism, its importance in the State, and appropriate control measures.

CRAIGIE (J. H.). **Studies in cereal diseases. XII. Stem rust of cereals.**—*Fmrs' Bull. Canad. Dep. Agric.* 84, 39 pp., 26 figs., 1940.

This is a very comprehensive survey of the available information on stem rust of cereals and grasses (*Puccinia graminis*), with special reference to the conditions governing its development and spread in Canada and North America generally. The life-cycle of the fungus is clearly explained and sections are included on physiologic specialization within the species, the mechanism of hybridization, the relative significance of different sources of infection, and the control of the disease by direct and indirect measures. The bibliography of specially selected references comprises 55 titles.

PETERSON (R. F.), JOHNSON (T.), & NEWTON (MARGARET). **Varieties of Triticum vulgare practically immune in all stages of growth to stem rust.**—*Science*, N. S., xci, 2361, p. 313, 1940.

Of the various wheat varieties tested at the Dominion Rust Research Laboratory, Winnipeg, for resistance to stem rust (*Puccinia graminis tritici*), five varieties received from Kenya, namely, 122. D.I.T. (L), 117. E. 16. B. 1, 117. B. 5. B. 2, 117. K. 16. A. (L), and 117. 1. 5. F. (L) [cf. *R.A.M.*, xi, p. 163; xvi, p. 520], and one local variety, known as McMurachy's Selection, were found to be practically immune at every stage of growth from all physiological races of the rust occurring in Canada. For a number of years these varieties have been artificially infected with about 30 races in the field and have shown only an occasional trace of rust. In the greenhouse, seedlings artificially infected with 20 races of the rust showed no rust pustules, except at abnormally high temperatures when the resistance was found to break down, but occasionally minute flecks were observed. Infection was obtained by injecting uredospores within the leaf sheath, but such infections may be produced on most wheat varieties that are immune in the field.

STAKMAN (E. C.) & HAMILTON (L. M.). **Stem rust in 1938.**—*Plant Dis. Reptr, Suppl.* 117, pp. 69–83, 3 maps, 1939. [Mimeographed. Received May, 1940.]

Both stem (*Puccinia graminis tritici*) and leaf [*P. triticina*] rusts of wheat were epidemic in the United States in 1938 [*R.A.M.*, xix, p. 203], the losses ranging from under 5 to 10 per cent.; oats were equally heavily infected by *P. graminis* (*avenae*) in Oklahoma, Illinois, and possibly Kansas. The stem rust inoculum is believed to have been carried southwards by northerly winds from *Hordeum jubatum* and late oats, which were found infected towards the end of August, 1937, in southern Minnesota, Iowa, and northernmost Missouri. Observations in Southern Mexico in February, 1938, indicated that this region does not ordinarily take part in the interchange of rust from north to south and from south to north, but nine races were found in northern Mexico all of which were subsequently found in the United States. Slide exposures indicated that *P. graminis* spores were in the air as far north as Nebraska during eight periods both in May and June; they were also trapped in large numbers on 9th July in Montana, which usually escapes attack. Physiologic race 56 was predominant during the epidemic, accounting probably for 90 per cent. of the inoculum and constituting 66 per cent.

of the isolates; it was followed by 38, 19, 17, and 11, with 15·5, 6·4, 3, and 2 per cent., respectively. *P. g. tritici* was the most prevalent strain of the rust on barberries, being represented in 78 per cent. of the collections, followed by *P. g. secalis* and *P. g. avenae* in 19 and 12·5 per cent., respectively, race 56 of *P. g. tritici* again preponderating (36·2 per cent. as compared with 9·9, 7·3, 7·3, 6·5, 6·1, 5·3, 4·9, and 4·2 for 38, 36, 17, 19, 34, 21, 49, and 11, respectively).

Wright (L. K.) & Kirby (R. S.). **Barberry eradication in Pennsylvania.** —*Proc. Pa Acad. Sci.*, xiii, pp. 41–42, 1939.

Since the initiation in 1935 of an intensive barberry eradication campaign against cereal black rust [*Puccinia graminis*] in Pennsylvania under the joint auspices of the Federal and State authorities, a total of 5,411 square miles of territory has been covered (up to 28th February, 1939), comprising nearly 3,000,000 bushes and over 6,000,000 seedlings on 5,712 properties. In 108 fields in the eradication area, the average annual oat yield during the five years immediately preceding the institution of the operations was 16·13 bush. per acre, while in the first season after the start of the campaign it amounted to 42·68 bush. Wheat yields in 11 fields increased from 9·54 to 23·36 bush. per acre. The oats (*avenae*) and rye (*secalis*) forms of the rust are more common and destructive in the State than that of wheat (*tritici*), largely owing to the prevalence of the grasses *Dactylis glomerata* and *Agropyron repens*, which act as hosts of the two former.

Sibilia (C.). **Le razze fisiologiche di 'Puccinia graminis tritici' Erikss. et Henn. nell' Africa Orientale Italiana.** [The physiologic races of *Puccinia graminis tritici* Erikss. & Henn. in Italian East Africa.]— *Boll. Staz. Pat. veg.*, *Roma*, N.S., xix, 4, pp. 497–508, 1 map, 1939. [Issued March, 1940.]

From wheat procured from 14 different localities in Italian East Africa the author obtained 13 further new physiologic races of *Puccinia graminis* (in addition to the four already found) [*R.A.M.*, xviii, p. 507], designated A.O.I. 5 to 17. All 17 races fell into three groups. The first (A.O.I. 2, 5, 8, 9, 10, 13, 14, 16) consisted of those that produced heavy infection on Little Club or Jenkin wheat and very weak or no infection on Vernal and Khapli; in this group, heaviest infection occurred on Mindum and Kubanka wheats. The races composing the second group (A.O.I. 1, 3, 6, 7, 11, 12, 15, 17) gave strong infection on Little Club, average or strong infection on Khapli, no infection on Reliance, and strong infection on Arnautka, Mindum, Spelmar, and Einkorn. The third group, consisting of A.O.I. 4 alone, gave weak or no infection on Little Club and very heavy infection on Khapli.

Of the ten other physiologic races of *P. graminis* known in Africa, all those from Kenya (17, 21, 34, and 116) [ibid., xiii, p. 361] fall into the first group, while of those from South Africa not found in Kenya (13, 29, 38, 98, 99, and 100) [ibid., xv, p. 6.], the first four fall into the first group, race 100 perhaps also belongs to it, though this race has an indeterminate effect on Vernal, and race 99 most resembles those in the third group.

Races A.O.I. 1 and 5 were found in Amara, races A.O.I. 1, 2, 3, 6, 7, 8,

9, 10, 11, and 12 in Scioa, race A.O.I. 13 in Galla and Sidama, and races A.O.I. 4, 14, 15, 16, and 17 in Harrar.

Pan (C. L.). **A genetic study of mature plant resistance in spring Wheat to black stem rust, Puccinia graminis tritici, and reaction to black chaff, Bacterium translucens var. undulosum.**—*J. Amer. Soc. Agron.*, xxxii, 2, pp. 107–115, 1940.

A tabulated account is given of the writer's studies at the Minnesota Agricultural Experiment Station on the inheritance of reaction to stem rust (*Puccinia graminis tritici*) and black chaff (*Bacterium translucens* var. *undulosum*) in crosses of Marquis × H. 44, III–31–7, and Pentad × Marquis, III–34–1, with Minnesota Double Cross, II–21–80, Hope, and H. 44 [*R.A.M.*, xiii, p. 428].

Resistance to stem rust was apparently dominant to semi-resistance, the data indicating that Marquis × H. 44 carries a single dominant gene allelomorphic to that borne by Hope and H. 44, and that Minnesota Double Cross is the bearer of two complementary factors for semi-resistance similar to those carried by Pentad × Marquis.

Susceptibility to black chaff appeared to be dominant to resistance. There was an incomplete association between resistance to stem rust and susceptibility to black chaff; hybrid plants resistant to both diseases were encountered, but not a single individual susceptible to both was found.

Noll (W.). **Deformaciones provocadas en los gérmenes del Trigo por los tratamientos de la semilla.** [Deformities induced in Wheat seeds by treatments of the grain.]—*Arch. fitotec. Uruguay*, iii, 1, pp. 86–95, 7 figs., 1938. [English and German summaries. Received April, 1940.]

In laboratory germination tests with nine pedigree wheats at the National Plant Breeding Institute of Uruguay, carried out in sand and on blotting paper, injury to the seedlings in the form of retarded growth or tumour formation on the coleoptiles and roots, resulted from excess treatments against bunt [*Tilletia caries* and *T. foetens*] with ceresan dust (U.T. 1875a), granosan No. 1, uspulun dust, copper sulphate, mercuric chloride, and ceresan liquid (U. 564) [*R.A.M.*, xiii, p. 624: xix, p. 269]. The abnormalities occurred chiefly in the lots treated with ceresan dust and granosan and were shown by intensive histological and cytological studies to resemble those due to the application of colchicin in two respects, namely, (1) the tumours are induced by hypertrophy of the existing cells, not by an increase in their numbers; (2) giant cells, with two to eight nuclei, are nearly always present in the outgrowths. Wheat seeds germinated in colchicin solutions developed with malformations similar to those observed in the dusted lots.

Churchward (J. G.). **The initiation of infection by bunt of Wheat (Tilletia caries).**—*Ann. appl. Biol.*, xxvii, 1, pp. 58–64, 1 pl., 3 figs., 1940.

In a study on the mode of penetration of wheat by *Tilletia caries*, the coleoptiles of the wheat varieties [Little] Joss (susceptible) and Hussar (resistant) were inoculated with cultures from single and from masses of

secondary basidiospores, and also from chlamydospores. Two types of mycelium developed when secondary basidiospores were used: one was narrow (approximately 1·5 μ in diameter), non-septate, regular in outline, occasionally branched, and not deeply stained by cotton blue or carbol thionin; the other arose as a result of fusion between two narrow hyphae, was thicker (approximately 3 μ in diameter), irregular in outline, and more deeply stained. In it the nuclei were associated in pairs. Hyphal fusion was strikingly rapid. No fusion occurred between the hyphae of a single-spore culture derived from a secondary basidiospore. Attempts to induce hyphal fusion of compatible strains on artificial media of different kinds were unsuccessful. In the process of infection an appressorium was formed from below the 'fusion hypha' at the slight depressions on the surface where the epidermal cells meet, and penetration, which was always intercellular, was accomplished by means of a small peg through the plant cuticle between the epidermal cells. No penetration was observed by the promycelium of the chlamydospores or by mycelia derived from fused primary sterigmata or from single basidiospores, and it is concluded that hyphal fusion is prerequisite for penetration. Immediately after penetration the hypha broadened to form a swollen irregular cell, into which passed the contents of the appressorium. In this cell the nuclei were associated in pairs. Reaching the first cross-wall this enlarged hypha bifurcated to form a narrow, somewhat gnarled, intercellular mycelium, in which the nuclei were no longer associated.

Millikan (C. R.). **The influence of nutrition on the reaction of Wheat to Urocystis tritici Koern. Part III.**—*J. Dep. Agric. Vict.*, xxxvii, 12, pp. 587–596, 8 figs., 1 graph, 1939.

In an account of further experiments on nutritional factors affecting flag smut of wheat (*Urocystis tritici*) [*R.A.M.*, xviii, p. 791], the author describes in detail the symptoms in wheat of deficiency and excess of a number of elements.

A calcium excess of twice the normal dosage significantly increased infection in the Free Gallipoli variety; a four times normal excess had no effect; but severity of attack was increased by combining double calcium with one-fourth magnesium and one-tenth phosphorus. Excess of phosphorus or potassium alone had no effect.

With the Ghurka variety no treatment increased susceptibility to any degree comparable with that of susceptible controls grown under the same conditions. One observation indicated that with this variety development of *Erysiphe graminis* was greatly reduced by deficiency of phosphorus in the plant.

In field tests with Free Gallipoli it was found that considerable variations in the reaction to flag smut were induced by different soil treatments, and these differences were correlated with those induced in the calcium contents. Under the conditions of any particular experiment an optimum concentration of calcium in the plants for the development of *U. tritici* occurred at nine weeks after germination (six in one case). This period is a critical one in the development of infection, as sori consistently first appeared in the tests approximately eleven weeks after germination.

Comparative tests on the effects of soil treatments on reaction to flag smut by the susceptible Free Gallipoli and the resistant Ghurka varieties indicated that the degree of resistance of a wheat variety determines whether such treatments will affect its flag smut reaction, the resistance of Ghurka being significantly increased by a soil treatment that had no effect on the reaction to *U. tritici* of Free Gallipoli.

Sabourova (Mme P. B.). Анатомо-морфологические изменения колоса Пшеницы, пораженного **Ustilago tritici (Pers.) Jens.** [Anatomical and morphological changes in Wheat ears infected with *Ustilago tritici* (Pers.) Jens.]—*Bull. Pl. Prot., Leningr., 1939*, 1, pp. 111–118, 8 figs., 1939. [Received April, 1940.]

A study made in 1936–7 in Leningrad showed that the striking changes wrought in wheat ears (varieties Albassar and Albidum) by *Ustilago tritici* [*R.A.M.*, xvii, p. 130] become manifest when the third or more usually fourth node is formed; they consist of (*a*) an underdevelopment or complete absence of awns (particularly noticeable in the awned Albassar), (*b*) the appearance of brownish stripes along the whole length of the ear due to accumulation of spores, and (*c*) malformation of the spikelets which are slightly flattened and project from the axis of the ear. The diseased ears of plants showing the third or fourth node are usually larger than those of healthy ones and have fewer spikelets. In earlier stages the mycelium in the ears is sparse and usually intercellular, while later on it spreads, and sometimes becomes intracellular.

Markevicz (N.P.). Перезимовка и поражаемость снежной плесенью экотипов озимой Пшеницы. [The overwintering and susceptibility to snow mould of ecotypes of Winter Wheat].—*Bull. Pl. Prot., Leningr., 1939*, 1, pp. 119–121, 1939. [Received April, 1940.]

The world collection of winter wheats of the Pan-Soviet Institute of Plant Protection was tested in 1938 near Leningrad for resistance to snow mould, *Fusarium nivale* [*Calonectria graminicola*: *R.A.M.*, xix, p. 337]. The 750 samples tested, grouped in 19 ecotypes, exhibited great differences in susceptibility. The ecotypes from the north overwintered well and showed little infection, whereas those from the south overwintered badly and were very susceptible to infection. A high negative correlation has thus been established between the ability of the plant to overwinter and the development of snow mould.

Semeniuk (W.). **Physiologic races of Ustilago hordei (Pers.) K. and S. in Alberta.**—*Canad. J. Res.*, Sect. C., xviii, 3, pp. 76–78, 1940.

Among the 12 collections of *Ustilago hordei* [*R.A.M.*, xvii, p. 308] obtained from widely separated points in Alberta, four (B, F, H, and L) were found in tests made in 1935 and 1937 to differ consistently in their respective ability to infect the barley varieties Colsess, O.A.C. 21, Hannchen, and Trebi, indicating the presence of four distinct physiologic races. In tests in 1938, however, the distinctions between collections F, H, and L had practically disappeared and only collection B again clearly differed from the others in its inability to produce more than slight infection on Colsess. The cause of the sudden change in patho-

genicity remains obscure. It may be that most, if not all, races of *U. hordei* are highly heterozygous with respect to pathogenic qualities. It is also possible that seasonal differences in the environment may have favoured the multiplication of certain biotypes within the collections.

Johnson (T.) & Newton (Margaret). **Crossing and selfing studies with physiologic races of Oat stem rust.**—*Canad. J. Res.*, Sect. C., xviii, 2, pp. 54–67, 1 pl., 1 fig., 1 diag., 1940.

In studies on the selfing and crossing of physiologic races 2, 3, 5, 6, 7, 8, and 10a of *Puccinia graminis* of oats evidence was obtained that some races contain both homozygous and heterozygous lines. In the progeny of the selfed heterozygous races 3, 5, and 8, and of the crosses between races 2 and 7, 7 and 10a, 5 and 10a, and 5 and 6, the small pustule type was dominant over the large pustule type. It is concluded that the selfing of heterozygous races tends to produce more virulent strains than the parent race, while crossing tends to produce hybrid races resembling the less virulent of the two parents, both processes indicating that the more virulent characteristics of the rust are recessive. In reciprocal crosses between races 5, 6, 7, 8, and 10a, the hybrid race showed a well-marked tendency to resemble the maternal parent in the type of infection produced on Joanette Strain. This phenomenon is explained on the assumption that each hybrid receives from the paternal race only a nucleus, but from the maternal race both nucleus and cytoplasm. In crosses between races of the normal red and orange uredinial colour [cf. *R.A.M.*, xvii, p. 449], red was invariably dominant. Two selfing studies of race 3, the first with teleutospores about six months old, and the second following a dry storage of the same teleuto material at about 8° to 10° C. for almost five years, showed that a genetic change, probably due to ageing, has taken place in the stored teleutospores. In the first series no abnormality in infection occurred, while in the second only about half of the infections developed pycnidia and pycnidial nectar, the remainder having the appearance of small, round necrotic areas, frequently surrounded by a purple halo, without an indication of any pycnidial formation.

Torrie (J. H.). **Correlated inheritance in Oats of reaction to smuts, crown rust, stem rust, and other characters.**—*J. agric. Res.*, lix, 11, pp. 783–804, 4 figs., 3 graphs, 1939.

The following results were obtained in field and greenhouse studies on the mode of inheritance of disease resistance and various kernel characters in oats [cf. *R.A.M.*, xix, p. 271], conducted from 1936 to 1938 in Wisconsin. The inheritance of smut (*Ustilago avenae* and *U. levis* [*U. kolleri*]) reaction, as indicated by the F_3 distribution of several crosses of oats for percentage of smutted plants, was governed by two factors, one for high resistance, and the other for partial. The segregation for crown rust (*Puccinia coronata*) reaction in the cross Iowa No. 444 × Bond suggested the presence of two factors, S, a factor for resistance, and I, a factor which partly inhibits the expression of S. The masking effect of I was greater in the mature plant in the field than in seedlings in the greenhouse. The reaction of the F_3 seedlings to individual races of *P. coronata* was the same as that obtained when a composite inoculum

was used. The F_1 seedling reaction indicated a partial dominance of resistance to *P. coronata*, whereas the mature plant showed a partial dominance of susceptibility. Generally speaking, the agreement between seedling and mature plant reactions was close. The inheritance of stem rust (*P. graminis*) was governed by a single factor pair, resistance being dominant over susceptibility. The agreement between seedling and mature plant reactions was very close. In the cross Iowa No. 444 × Bond the smut and rust reactions were inherited independently of each other and of the characters earliness, basal articulation, and basal hair length.

Down (E. E.) & Thayer (J. W.). **Huron, a new Oat variety for Michigan.** —*Quart. Bull. Mich. agric. Exp. Sta.*, xxii, 3, pp. 209–212, 1940.

Full particulars are given of Huron, a prolific, medium-early, yellowish-grained variety of oats, developed at the Michigan Agricultural Experiment Station from a cross between Markton and Victory and characterized by a high degree of resistance to smut [*Ustilago avenae* and *U. kolleri*].

McNew (G. L.). **Invasion of Sweet-Corn plants of different ages by strains of Phytomonas stewarti.** —*Phytopathology*, xxx, 3, pp. 244–249, 1 fig., 1 graph, 1940.

In further experiments at the Rockefeller Institute for Medical Research on the effects on 7- to 24-day-old Golden Bantam maize seedlings of inoculation with strains of *Phytomonas* [*Aplanobacter*] *stewarti* of varying degrees of virulence [*R.A.M.*, xix, p. 338], highly virulent strains, such as B-1011, were equally invasive on both young and older plants (up to 31 and 57 days in another series of tests), whereas weakly virulent strains were much more pathogenic to seedlings over 14 days old than to younger ones. The less virulent strains of the bacterium being obligate users of organic nitrogen, it is suggested that compounds of this substance develop in the tracheal tubes after the plant has become established and begun to synthesize its own organic materials.

Elliott (Charlotte) & Robert (Alice L.). **Sectoring in colonies of Aplanobacter stewarti.**—*Phytopathology*, xxx, 3, pp. 276–278, 1 fig., 1940.

Potato dextrose agar cultures of one (3b6) out of five single-cell isolations of *Aplanobacter stewarti* from maize gave rise to pure white sectors in the yellow growth [*R.A.M.*, xvii, p. 517]. No dissociation was observed on beef-peptone agar, but platings on potato dextrose agar from broth cultures yielded colonies nearly all of which showed sectoring. Some of these retained the same colours on subculturing, while others segregated into white and yellow or resumed the typical yellow of the species. From two pure white colonies without sectors only white colonies were obtained. When inoculated into maize and reisolated from the wilt lesions, the white cultures remained white and the yellow formed yellow colonies. The parent culture 3b6 is only weakly virulent in comparison with the strong pathogenicity of the other four, and no evidence was obtained in four tests with the 53 transfers of white or

yellow sectors of any access of infectivity through saltation [ibid., xix, p. 338]. Culture 3b6 also differs from the other four isolates under observation in its alkaline reaction to litmus milk, which persisted in the 53 transfers.

NAUDE (C. P.). **Removal of sooty blotch from Oranges.**—*Bull. Dep. Agric. S. Afr.* 212, 13 pp., 1940.

In bleaching tests conducted in 1937–8 in South Africa in the control of sooty blotch of oranges (*Gloeodes pomigena*) [*R.A.M.*, xviii, p. 796; xix, p. 211], it was found that the addition of 3·2 oz. of soda ash to a solution containing 4 oz. chloride of lime and 2 or 4 oz. boracic acid per gal. water resulted in a high bleaching efficiency which was retained much longer than that of the eusol bleaches. A cheaper solution consisting of equal parts of chloride of lime and sodium bicarbonate proved as effective in bleaching as eusol or eusol-soda ash mixtures. It is suggested that baths containing the bleaching solutions should be kept in a cool place and be preferably constructed of wood or cement, as sunlight, iron, and galvanized iron decompose the solutions very rapidly. In baths constructed of iron or galvanized iron the metal should be protected from the solution by one coat of primer and three coats of a good acid-resistant paint.

WAGER (V. A.). **Alternaria citri and the November-drop problem of Washington Navel Oranges in the Kat River Valley.**—*Sci. Bull. Dep. Agric. S. Afr.* 193, 18 pp., 2 figs., 1939.

Orange trees in South Africa are stated to drop large numbers of their young fruits; those up to 0·4 in. in diameter, designated 'shed fruits', drop with their pedicels still attached, and those over 0·4 in. and up to 1·5 in. in diameter, designated 'dropped fruits', dehisce above the calyx and drop without their buttons. The problem of dropped fruits, which occur during November and December, has been investigated during 1935 to 1937 in the extensive citrus-growing areas of the Kat River Valley in the eastern Cape Province. Fruit counts from individual trees showed that the drop varied from 200 to 500 for trees which subsequently bore 600 to 800 fruits, thus representing a considerable loss in yield. Drop invariably followed three to eight days after a spell of hot weather comprising a shade temperature from 85° to 110° F., relative humidity from 5 to 15 per cent., and dry winds, young out-of-season fruits being affected in the same manner as in-season ones. Fruits most usually affected by drop were those from 0·4 to 1 in. in size. The fungus *Alternaria citri* [*R.A.M.*, xvii, p. 442] being suspected of playing a part in the drop problem, cultures were made of some 3,000 dropped fruits from various localities and the fungus was detected in the navel ends of 20 to 100, most usually about 60 per cent., of all samples. Cultures of green healthy fruits also yielded the fungus in almost the same degree as those of dropped ones, indicating that its presence has no bearing on the cause of the drop. The fungus appeared to enter the fruit shortly after the style has dehisced and the fruit is 0·2 to 0·4 in. in size, and to penetrate as far as the centre of the fruit, but it is not present in the calyx end. Trees sprayed with Bordeaux mixture (4–4–50), lime-sulphur (1–60), or zinc sulphate and lime (10–5–100) five times

during the season at weekly intervals showed no improvement over the unsprayed controls, nor did the application of three additional heavy doses of nitrogen to trees normally receiving heavy applications of nitrogen prevent drop. Internal discoloration of the navel end found in some dropped fruits was also found in healthy green ones and does not seem to be correlated with drop. Other fungi were also present in both dropped and healthy green fruits, the most common being *Fusarium lateritium* and *Colletotrichum gloeosporioides*. The drop is considered to take place as a result of hot, dry weather with strong winds, and it is suggested that planting of a cover crop, such as clover, between the citrus trees would increase the humidity of the air on hot days and thus reduce the effects of adverse weather conditions.

Ciferri (R.) & Redaelli (P.). **Segnalazione dello Sporendonema epizoum (Cda) Cif. et Red. su frutti di Dattero in Libia.** [Report of *Sporendonema epizoum* (Cda) Cif. & Red. on Date fruits in Libya.]—*Mycopathologia*, ii, 3, pp. 162–163, 1940.

The authors state that they observed *Sporendonema epizoum* [*R.A.M.*, xvi, p. 385; xvii, p. 321] on dates purchased in Florence and said to have been grown in Libya. The fungus formed punctiform, pulvinate-hemispherical, chocolate- to snuff-coloured, almost velvety, isolated, occasionally confluent colonies 1 to 1·5 (rarely up to 2) mm. in diameter. Only a few fruits in the packet were affected. The validity of the genus *Sporendonema* is maintained and 16 synonyms of *S. epizoum* are listed including *Torula epizoa* [loc. cit.; see also ibid., xi, p. 241], *Hemispora stellata* [ibid., xvii, p. 38], *Oospora d'agatae* [ibid., xvi, p. 385], *T. fuliginea* [ibid., viii, p. 66], and *T. pulchra* [ibid., xiii, p. 700].

Gillett (S.). **Report on a visit to the Coffee growing centres in Jamaica, Costa Rica, and Colombia.**—*Mon. Bull. Coffee Bd Kenya*, vi, 2, pp. 24–27; 3, pp. 40–42, 10 figs., 1940.

Among the diseases observed by the writer in a tour of inspection of the coffee plantations of Jamaica, Costa Rica, and Colombia were *Cercospora coffeicola* (in all three countries), *Omphalia flavida* (in Costa Rica and Colombia, serious in the former), *Rosellinia* root rot (in Costa Rica and Colombia, very destructive in the latter country, where two species appear to be concerned), *Pellicularia* [*Corticium*] *koleroga* (in Costa Rica), and *Colletotrichum coffeanum* [*Glomerella cingulata*] (in Colombia).

Mayne (W. W.). **Coffee leaf disease attacks in 1940.**—*Plant. Chron.*, xxv, 3, p. 53, 1940.

As a result of prolonged dry weather in 1938–9 and dry conditions during the hot months in 1939, attacks of coffee leaf disease [*Hemileia vastatrix*: *R.A.M.*, xviii, p. 735] in 1939 were exceptionally light in most parts of Mysore and Coorg. The coffee, early in 1940, was consequently very full of leaf, but there was also a considerable amount of late infection, much of it unlikely to be eliminated by leaf fall during dry weather. It is urged that every effort should be made to carry out complete spraying programmes during the hot season in order to reduce the risk of severe attacks likely to result from the heavy carry-over of lightly infected leaf from the late and comparatively light attacks in 1939.

MAYNE (W. W.). **The possibility of reducing the strength of Bordeaux mixture for the control of Coffee leaf diseases.**—*Plant. Chron.*, XXXV, 5, pp. 95–97, 1940.

To ascertain whether Bordeaux mixture when used at concentrations weaker than 2–2–40 would give adequate control of coffee leaf disease [*Hemileia vastatrix*: see preceding abstract], an experiment was carried out in southern India in which coffee which had received a uniform 2–2–40 spray in the hot weather of 1939 was sprayed (on 25th and 26th October, 1939, after the south-west monsoon) with Bordeaux mixture 1–1–40, 1½–1½–40, and 2–2–40. Statistical analysis of the results showed a significant difference between the 2–2–40 strength and the others, and it is concluded that use of the weaker concentrations entails some risk of reduced efficiency. The use of a weaker spray than 2–2–40 is not recommended for the hot weather application.

With reference to the present need for economy, it is pointed out that to spray at a reduced strength is probably better than not spraying at all, and that the use of a weaker spray may give better results than reducing the acreage treated.

DICK (J. B.). **Fertilizers in relation to incidence of wilt as affecting a resistant and a susceptible variety [of Cotton].**—*Proc. Ass. Sth agric. Wkrs*, xl, p. 68, 1939. [Abs. in *Chem. Abstr.*, xxxiv, 8, pp. 2513–2514, 1940.]

The incidence of wilt [*Fusarium vasinfectum*] reached a maximum, with a correspondingly reduced cotton yield, in the absence of potash [*R.A.M.*, xvi, p. 156], increasing amounts of which diminished the amount of infection, but when applied in excess (600 lb. 6–8–16 fertilizer per acre) greatly lowered yields in the resistant cotton variety, while not appreciably affecting those of the susceptible one. Nitrogen and potash, singly or in certain combinations, effectively reduced wilt and augmented yields, whereas phosphate, especially in the absence of nitrogen and potash, increased the incidence of infection.

THARP (W. H.) & WADLEIGH (C. H.). **The effects of nitrogen source, nitrogen level, and relative acidity on Fusarium wilt of Cotton.**—*Proc. Ass. Sth agric. Wkrs*, xl, pp. 190–191, 1939. [Abs. in *Chem. Abstr.*, xxxiv, 8, pp. 2514, 1940.]

In greenhouse sand-nutrient experiments a highly significant increase in cotton wilt (*Fusarium*) [*vasinfectum*: see preceding abstract] was associated with heavy applications of nitrate and an even greater one with similar doses of ammonia. Susceptible plants supplied with the high nitrate solution at $P_H 8$ were less severely diseased than at either 6 or 4, whereas the opposite was the case with ammonia.

WRIGHT (E.). **First progress report on the Phymatotrichum root rot losses in experimental windbreaks of Oklahoma and Texas.**—*Plant Dis. Reptr*, xxiv, 1, pp. 13–20, 1940. [Mimeographed.]

During 1939, some 27 miles of experimental windbreaks planted in Oklahoma and Texas were inspected for root rot due to *Phymatotrichum omnivorum* [*R.A.M.*, xviii, p. 674]. Of the total mileage, about seven

miles were critically examined, detailed notes being made on the losses of the different species. The evidence obtained [which is tabulated] demonstrated that *Ailanthus altissima* showed nearly 100 per cent. survival in a locality where severe infection was present. *Juglans nigra*, *J. major*, soapberry (*Sapindus drummondii*), and apricot also showed resistance. It would appear that no species that can be used in windbreaks on infected soil will prove to be immune. In general, seedlings are more susceptible than older trees.

Haskell (R. J.) & Barker (H. D.). **Cottonseed treatment.**—*Leafl. U.S. Dep. Agric.* 198, 8 pp., 3 figs., 1 diag., 1940.

This is a popular note on the control of seed-borne diseases of cotton, with special reference to anthracnose [*Glomerella gossypii*: *R.A.M.*, xix, p. 212] by seed treatment with 2 per cent. ceresan (3 oz. per bush.) or new improved ceresan (1½ oz.) [ibid., xix, p. 146]. The cost of the two preparations is estimated at 9½ to 14 cents for ceresan and 5 to 7 for new improved, and the outlay per acre, at a sowing rate of 5 pecks, at 12 to 24 cents (inclusive of labour). The North Carolina Extension Service estimated that the average net profit per acre from seed disinfection on 43 farms in 1936 was $13.05 and on 100 in 1937 $11.27. In that State disinfectant treatment was practised over some 600,000 acres in 1939 as compared with 2,000, 7,000, 24,000, 200,000, and 450,000 in 1934, 1935, 1936, 1937, and 1938, respectively. Directions are given for the construction of a home-made treating machine from a rotating barrel or oil-drum mixer, while for large-scale use satisfactory power-driven automatic appliances, capable of handling up to 60 100-lb. sacks per hour, are available on the market.

Goidànich (G.). **L' 'Aspergillus alliaceus' Thom et Church isolato da capsule di Cotone coltivato in Sicilia.** [*Aspergillus alliaceus* Thom & Church isolated from Cotton bolls grown in Sicily.]—*Boll. Staz. Pat. veg., Roma*, N.S., xix, 4, pp. 488–496, 1 pl., 3 figs., 1939. [Issued March, 1940.]

In 1938, the author isolated *Aspergillus alliaceus* [*R.A.M.*, xvii, p. 325] from Sicilian cotton bolls. Infection was general throughout the carpellary column and extended to the carpels. The part of the fibre in which mycelium was present was light yellow, indurated, and mummified. A full description of the morphology of the fungus is given and experimental inoculations of its natural host, garlic, are stated to have produced slow but serious infection, which was clearly favoured by high humidity.

Botero (R. O.). **La stenosis: un achiciamento y arrugamiento del Algodón.** [Stenosis: a stunting and rugosity of Cotton.]—*Publ. Min. Econ. nac. Colombia*, 16 pp., 6 figs., 1940.

Information is presented on the occurrence of cotton stenosis [*R.A.M.*, xv, p. 717] in Colombia, where the UA-83 variety appears to be the most resistant. The Malvaceae *Sida acuta* and *S. salvaefolia*, both of common occurrence in the vicinity of affected plantings, show malformations of a similar type to those observed on cotton and may be hosts of the same pathogenic agent.

Heim (R.). **Les champignonnières des Termites et les grands champignons d'Afrique tropicale.** [The mushroom beds of Termites and the large mushrooms of tropical Africa.]—*Rev. Bot. appl.*, xx, 222, pp. 121–127, 1940.

The author, after describing the development of fungi in the nests of termites, states that these fungi grow simply because the conditions are favourable, without any direct connexion with the insects. While hitherto only three Agarics have been recorded as termite-nest fungi in Africa, he found about a dozen species in the course of a visit to the Ivory Coast. These included edible species with pilei up to 30 cm. in diameter.

Many fungi regarded as strictly terrestrial were observed in equatorial forests to be growing on wood. Further, practically all the fleshy fungi noted in tropical and equatorial forests showed in the pileus a very thin flesh, while the gills tended to be few and thick. Fungal forms specifically related to European fungi, such as *Armillaria mellea*, *Clitocybe nebularis*, *Collybia maculata*, and *Marasmius longipes* were observed with a pelliculose pileus and lamellae less dense than in Europe.

Mains (E. B.). **Cordyceps species from British Honduras.**—*Mycologia*, xxxii, 1, pp. 16–22, 2 figs., 1940.

The following are recorded in this list of species of *Cordyceps* [*R.A.M.*, xviii, p. 798] collected during 1936 in British Honduras: *C. amazonica* on cockroaches, which differs from *C. blattae* described by Petch [ibid., iv, p. 167] in a number of important respects, especially in having clavate asci and fusoid ascospores; *C. curculionum* on adult *Curculio* beetle; *C. elongata* on a larva of a Lepidopterous insect in a cocoon; *C. submilitaris* on large larvae of beetles in rotten logs; *C. belizensis* n.sp. [with a Latin diagnosis] on a larva of a Lepidopterous insect; *C. sphingum* on mature *Sphinx* moth; and *C. viperina*.

Hanson (H. S.). **Ecological notes on the Sirex wood wasps and their parasites.**—*Bull. ent. Res.*, xxx, 1, pp. 27–65, 6 pl., 1939.

In connexion with ecological studies on the wood wasp *Sirex noctilio* and its parasites, in progress at the Farnham House Laboratory, Imperial Institute of Entomology, since 1927, it is mentioned that entomogenous fungi play no part in the control of *Sirex*, but that *Armillaria mellea* and *Fomes annosus*, which cause the death of trees (silver fir [*Abies alba*] in North Devon, are of considerable importance in that they provide an attractive breeding-ground [cf. *R.A.M.*, xix, p. 213]. Apart from this specific purpose, however, sound, freshly felled timber is preferred by the wasps, and wood actually permeated by fungal mycelium does not afford a suitable habitat for their subsequent development.

Thom (C.). **Naming molds.**—*J. Wash. Acad. Sci.*, xxx, 2, pp. 49–64, 1940.

In this paper the author discusses some of the problems facing the student of the co-called common moulds. He indicates the importance of critical observation and exact descriptions, and emphasizes the

essential value of correct nomenclature and identification, which is too often overlooked or even scouted by workers in applied mycology. As an example of a current problem of nomenclature, the author cites the synonymy of *Phialophora verrucosa* Medlar, described under this name in 1915. In 1920, a similar organism isolated at São Paulo by Pedroso and Gomes was referred to *P. verrucosa*, which has since been commonly cited as originated by Thaxter. In 1921, Brumpt renamed the São Paulo fungus *Trichosporium pedrosoi* Brumpt, and in 1922 he again renamed it *Hormodendrum pedrosoi*. In 1922, again, Terra, Torres, da Fonseca, and Areo de Leão in Rio de Janeiro transferred the same organism to *Acrotheca* as *A. pedrosoi* [*R.A.M.*, iii, p. 289]. In 1928, Ota distributed material under the same *T. pedrosianum*, but decided not to publish this name. In 1929, Ota's mould was assigned by Langeron to *T. pedrosoi* (Brumpt, 1921) [ibid., viii, p. 645]. In 1930, da Fonseca and Areo de Leão adhered to the name *A. pedrosoi* [ibid., xi, p. 645]. In 1935, Dodge transferred the species to the genus *Gomphinaria*. In 1936, Negroni named the fungus *Fonsecaea pedrosoi* (Brumpt) Negroni [ibid., xvi, p. 460]. In 1937, Moore and De Almeida, after collecting and comparing strains, added three more generic names (*Botrytoides*, *Hormodendroides*, and *Phialoconidiophora*) for the variations studied [ibid., xvi, p. 251]. In 1939, Briceño-Iragorry proposed a new generic name, *Carrionia* [ibid., xix, p. 278], with *C. pedrosoi* (Brumpt) Briceño-Iragorry as its type species, and expressed the view that this genus should include the fungus causing chromoblastomycosis in South America.

In 1928, Lagerberg, Lundberg, and Melin, working on forest pathology, found species with the sterigmatic cups characteristic of *Phialophora* on woody material in America and Sweden, and proposed the generic name *Cadophora* [ibid., ix. p. 77] for these forms, without observing their essential identity with *Phialophora*. Since then, morphological and serological comparison of materials from human and forest sources in culture has been found to support the identity of these genera, *Cadophora* 1928 thus giving way to *Phialophora* 1915 [ibid., xvii, p. 178]. The evidence, however, would seem against man-to-man communication of plant-inhabiting fungi, and if it is proved that these organisms belong to species found regularly on decomposing plant remains, occasional human infection from such plant material will not warrant the establishment of a genus or a species for that organism as a parasite. As the identity of *Hormodendrum* with *Cladosporium* has been conceded for 50 years, the rules of nomenclature relegate *Hormodendrum* to synonymy. Hence, the author considers that the chromoblastomycosis fungi must be assigned to *Cladosporium* unless adequate characters are available for separation into one or more other genera. Most workers agree that all the strains in question are closely related. Three kinds of spore production have been found, (1) the *Cladosporium* or *Hormodendrum* type of branching chains in which the newest cells constantly develop at the tips of the branches, (2) the type in which there is progressive reduction of the branching system to clusters of primary spores densely aggregated about the clavate ends of the fertile hyphae, and (3) the type described for *Phialophora*.

The author has studied in culture the *Cadophora* type of structure

from decaying plant material, and kept 20 cultures of strains of *Phialoconidiophora*, *Hormodendrum*, and *Botrytoides* under observation for two months, but found no reason for placing these fungi in different genera. If the strains from human sources can be segregated in a distinct genus, priority demands that *Phialophora verrucosa* Medlar should be the name.

Carrión (A. L.). **Estudio micológico de un caso de micetoma por Cephalosporium en Puerto Rico.** [A mycological study of a case of mycetoma caused by *Cephalosporium* in Puerto Rico.]—*Mycopathologia*, ii. 3, pp. 165–170, 2 pl., 1940.

A description is given of a species of *Cephalosporium*, which is not identified, isolated from a 'Madura foot' [*R.A.M.*, xvii, p. 111] in Puerto Rico. The only other species of the same genus, *C. recifei*, recorded in connexion with this disease from Brazil [ibid., xiv, p. 170], is distinct from the fungus under investigation.

De Almeida (F.). **Study of a black grain mycetoma due to Actinomyces paraguayensis Almeida, n.sp.**—*Mycopathologia*, ii, 3, pp. 201–203, 2 pl., 1940.

From a thoracic mycetoma with heavy, dark grains affecting a Canadian patient living in Paraguayan Chaco the author isolated a fungus which on Sabouraud's glucose agar formed a pseudomembranous colony with a raised, dark centre surrounded by a white band, progressively increasing in size, and then by a light chocolate area. The fungus is named *Actinomyces paraguayensis* Almeida, n.sp. [with a Latin description of the colonies].

Franklin (G. C. H.). **Actinomycosis: a new species, pathogenic for Man.**—*Ann. intern. Med.*, xiii, 7, pp. 1205–1213, 3 figs., 1940.

An *Actinomyces*, described [without a Latin diagnosis] as a new species under the name of *A. moormani*, was isolated from the pus of multiple molar abscesses in a 41-year-old male patient at the Dental Clinic, Fort Leavenworth, Kansas.

Figueroa (H.) & Conant (N. F.). **The first case of tinea imbricata caused by Trichophyton concentricum Blanchard 1896 reported from Guatemala.**—*Amer. J. trop. Med.*, xx, 2, pp. 287–301, 8 figs., 1940.

From the skin of a 20-year-old female Indian native of Guatemala suffering from tinea imbricata the writers isolated *Trichophyton concentricum* [*R.A.M.*, xviii, p. 678] on Sabouraud's glucose agar, this being the first record of the disease for the country. The microscopic aspect of the cultures (which produced cerebriform, brownish colonies with wide edges radially furrowed and covered with a short, white aerial growth) resembled that commonly ascribed to *Achorion*. The centre was occupied by swollen, torulose, short-celled hyphae of variable diameter, portions of which were filled with protoplasm, leaving deeply staining, large, swollen, or irregularly shaped cells giving rise to chlamydospores or large, hyaline, swollen bodies. Short lateral branches were prominent, and short, rapidly branching lateral hyphae arose from coarser,

amorphous filaments. Irregularly branching elements were observed at the edge of the culture, and in older portions of the growth the hyphae broke up into short-celled segments producing arthrospores.

From a critical study of the relevant literature it is concluded that the following species, among others, should be reduced to synonymy with *T. concentricum* (Blanchard, 1896): *Endodermophyton tropicale* Cast., *E. roquettei* Fonseca, *Mycoderma roquettei* Vuillemin, and *Achorion indicum* [ibid., xiv, p. 35]. The genus *Endodermophyton* should be discarded and species hitherto classified therein transferred to *Trichophyton*.

Peck (S. M.). **Symposium on allergic dermatoses.**—*J. Allergy*, xi, 3, pp. 309–314, 1940.

This is a review of some recent advances in the study of allergy as related to the development of fungus eruptions, with special reference to the two main groups of 'trichophytids' (*Epidermophyton* and *Trichophyton* spp.) and 'levurids' (*Monilia* [*Candida*] spp.), and to the therapy of disorders of the former group by means of trichophytin. The paper, presented at the 17th annual meeting of the American Society for the Study of Allergy in May, 1939, was followed by a discussion (pp. 314–318).

Ghosh (L. M.) & Maplestone (P. A.). **Epidermophytosis in a very young child.**—*Indian med. Gaz.*, lxxv, 2, p. 95, 1 fig., 1940.

Epidermophyton floccosum was recently isolated in pure culture from ring-shaped patches on the right shoulder of a seven-month-old female Hindu infant at the Calcutta School of Tropical Medicine, this being the first record within the authors' experience of ringworm of the glabrous skin in such a young child.

Castellani (A.). **Mycotic eczematous dermatitis of the toes due to Geotrichum rotundatum Cast. 1911, and Geotrichum rotundatum var. gallicum n.v.** –*J. trop. Med.* (*Hyg.*), xliii, 6, pp. 79–81, 5 figs., 1940.

The author has recently encountered [? in London] two cases, both of long standing, of interdigital eczematous dermatitis of the feet, one believed to have been contracted in India and the other in the South of France. The former is attributed to *Geotrichum rotundatum* Cast. 1911 [*R.A.M.*, xix, p. 93], and the latter to a new variety (*gallicum*) of the same fungus [no Latin diagnosis], differing from the type in its smaller hyphae (1·5 to 3·5, average 2 μ), and failure to acidify or clot milk. *Candida zeylanoides* [ibid., xix, p. 151] was also present in the second case, and may have been of etiological significance.

Parsons (C. G.). **Stomatitis in childhood.**—*Arch. Dis. Childh.*, xv, 81, pp. 43–54, 1940.

Monilia [*Candida*] *albicans* was isolated from 41 out of 60 cases of stomatitis in children under two, and from 10 out of 39 in those between two and ten years old at the Birmingham Children's Hospital in 1938.

Elisei (F. G.). **Malbranchea Sacc. considerato come un nuovo genere di dermatophytes.** [*Malbranchea* Sacc. regarded as a new genus of dermatophytes.]—*Boll. Soc. ital. Biol. sper.*, xv, 2, pp. 331–332, 1940.

The recent discovery by the author of a *Malbranchea* [cf. *R.A.M.*, xix., p. 150] on dying rice plants at the Pavia Botanical Institute led to a morphological study of the available herbarium material of the few species of the genus known, the results of which showed that, contrary to the statements of other workers, it comprises all the organs proper to the dermatophytes, namely, racquet mycelia, intercalary, apical, and lateral aleuroconidia, arthro- and chlamydospores, pectinate hyphae, nodular organs, spirals, and spindles.

Fouts (E. L.). **Effect of lactic acid on the hydrolysis of fat in cream by pure cultures of lipolytic micro-organisms.**—*J. Dairy Sci.*, xxiii, 4, pp. 303–306, 1940.

The growth of *Oidium* [*Oospora*] *lactis* [*R.A.M.*, xviii, p. 595] was somewhat restrained in the writer's experiments at the Oklahoma Agricultural College by the addition of butter culture organisms to cream, and definitely inhibited by the introduction of an excess of lactic acid.

Massey (L. M.) & Longrée (K[arla]). **Black mold disease of Rose grafts.**—*Flor. Exch.*, xciii, 18, p. 17, 1 fig., 1939. [Abs. in *Exp. Sta. Rec.*, lxxxii, 4, p. 503, 1940.]

A note is given on black mould of rose grafts at Cornell University, due to *Chalaropsis thielavioides* [*R.A.M.*, xiv, p. 801], not hitherto reported on the host in question.

Thomas (H. Earl) & Massey (L. M.). **Mosaic diseases of the Rose in California.**—*Hilgardia*, xii, 10, pp. 647–663, 6 figs., 1939.

Three distinct mosaic diseases of the rose [*R.A.M.*, xiv, p. 363] have been observed in central California and are designated rose mosaics 1, 2, and 3. So far, the first appears to be the principal disease of roses grown under glass, and the other two more common on those grown in the open. In addition, roses were infected by inoculation with apple mosaic [ibid., xvi, p. 687] and Winters peach mosaic [see below, p. 417].

Rose mosaic 1 produces small, chlorotic spots, angular or fringed, with clearing of the small adjacent veins, the leaf blade being more or less distorted and marked occasionally by pale bands or lines. On the four common stocks *R. chinensis* var. *manetti*, *R. multiflora*, *R. odorata*, and Ragged Robin symptoms are usually mild; blossoms of the top varieties may either be normal or severely dwarfed, pale, and of little commercial value. The symptoms produced by rose mosaic 2 are generally more conspicuous than those of mosaic 1; in the varieties Belle of Portugal, Cecile Brunner, Hollywood, and Independence Day it is characterized by chlorotic lines, bands, and broad blotches in the leaf blade with or without distortion, the plants being somewhat dwarfed in some cases and normal in others, and the blossoms normal. Mosaic 3 produces symptoms on the four common stocks which are similar to those of mosaic 2 but more severe, causing in some cases

distinct dwarfing, and showing more tendency towards broad chlorotic blotches and few lines and rings, with occasionally a conspicuous oak-leaf pattern and clearing of the veins of some leaves. Rose mosaic 1 can be readily distinguished from the other two by the symptoms alone and its failure to produce definite symptoms on Cecile Brunner and Independence Day. The separation of mosaics 2 and 3 is more difficult, since both of them and the mosaics of apple and peach may produce similar symptoms on roses. However, under comparable conditions they can be distinguished on varieties Hollywood and Belle of Portugal by the symptoms alone, mosaic 3 producing on the latter short, necrotic lines or bands along the midvein, considerable distortion of the leaf blade, and after becoming systemic, largely chlorotic symptoms, while no such reaction was obtained with mosaic 2 or apple mosaic. The variety Souvenir de Claudius Pernet, one of the most susceptible to mosaic 3, failed to develop symptoms of mosaic 2 up to 18 months after inoculation.

The characteristic feature of apple mosaic is the extremely slow rate of development in the rose, 20 to 27 months being required for the development of symptoms 6 in. below the point of inoculation. The Winters peach mosaic may be separated from rose mosaics 2 and 3 by the difference of symptoms in Hollywood and Ragged Robin and the failure of the two rose mosaics to infect peach. In preliminary trials with rose mosaic 1 the stock did not seem to influence the severity of the disease in the scion variety, but Belle of Portugal affected by mosaic 2 and grown on its own roots showed less severe symptoms than when grown on Manetti and Ragged Robin rootstocks. All these mosaics may fail to induce symptoms in some or all of the leaves of an affected plant at any given time; mosaic 1 is often masked for considerable periods in root-stocks. Some observations indicate that the use of buds from diseased plants might be an important means of spread of the viruses. When infected rose cuttings were exposed to heat under various conditions, the virus of mosaic 1 survived exposure to 30° (26 days), 36° (14 days), and 45° C. (30 minutes), but many of the cuttings died; the virus of mosaic 2 withstood exposure at 30° for 11 days.

Cadman (C. H.). **Graft-blight of Lilacs.**—*Gdnrs' Chron.*, cvii, 2768, p. 25, 1940.

In connexion with observations from 1936 to 1938 on 'graft blight' of lilacs in England, the writer draws attention to K. S. Chester's studies on an analogous disturbance in the United States [*R.A.M.*, x, p. 599], the cause in both countries presumably being incompatibility between the scion and the stock (privet in the English cases). The symptoms of the trouble include swelling of the base of the scion, accompanied by a tendency for the bark to over-roll the stock, yellowing, and thickening and brittleness of the foliage, leaf roll, premature defoliation, and general malformation of the bushes, all the symptoms becoming progressively more acute from year to year.

Smith (K. M.). **Graft-blight of Lilacs.**—*Gdnrs' Chron.*, cvii, 2778, p. 144, 1940.

The writer states that a lilac disease with symptoms exactly similar

to those described under the name of 'graft blight' [see preceding abstract], but due in this instance to a graft-transmissible virus, is at present under investigation at the Plant Virus Research Station, Cambridge.

Brierley (P.). **Prevalence of Cucumber and Tulip viruses in Lilies.**—*Phytopathology*, xxx, 3, pp. 250–257, 2 figs., 1940.

In investigations conducted at the United States Horticultural Station, Beltsville, Maryland, *Lilium formosanum* was found to be a satisfactory index plant for the tulip virus latent in lilies of certain species [*R.A.M.*, xvii, p. 41]. Symptoms on this host were recognizable 10 to 14 days after inoculation by rubbing the young leaves, whereas tulips inoculated with juice by hypodermic needle did not develop them until the following year. Of the seven varieties of Easter lilies tested, White Queen was the only one to remain free from infection, suggesting the extreme probability of the presence of the latent tulip virus in most commercial Easter lilies from all sources. On the other hand, six greenhouse-grown seedlings tested virus-free on both tulip and *L. formosanum*.

Combining Price's use of Turkish tobacco for the demonstration of cucumber virus in lilies [ibid., xvi, p. 615] with the above-mentioned *L. formosanum* test, a method entailing the simple mechanical inoculation of these two plants was used as an index of the occurrence of cucumber and tulip viruses in lilies [ibid., xix, p. 349]. Juice from the hybrid George R. Creelman lily, a carrier of both viruses, was applied to the young leaves, previously abraded by carborundum. If symptoms appeared after 4 to 6 days in tobacco (white, necrotic rings, sometimes followed by systemic mottling), a cucumber virus, probably, but not certainly, *Cucumis* virus 1, was considered to be present, while yellowing and curling of *L. formosanum* leaves after 6 to 10 days, succeeded by mottling of various types, denoted the development of a tulip virus. If both plants responded, the indexed plant was regarded as a carrier of the two viruses. During the summer of 1939 this technique was applied to garden lilies of a number of species and varieties from different localities in the United States and from Ottawa. The tulip virus was detected in 31 out of 41 species or varieties of lilies indexed from 13 out of 15 localities (including Ottawa), and that of cucumber in 18 from 9 districts (once from Ottawa). Both viruses were harboured by plants of 14 species or varieties from 7 localities, including *L. auratum*, *L. superbum*, *L. regale*, *L. sargentiae*, *L. tigrinum*, and *L. umbellatum*. Of the bulb-propagated species tested, 6 samples of *L. candidum* carried the tulip virus, 2 both viruses, and 10 of recent seed origin were healthy. All five samples of *L. elegans* were vectors of the tulip virus. *L. tigrinum* carried the tulip virus nine times and both viruses once, while 8 samples from 7 localities were free from infection. Two samples of *L. umbellatum* were apparently healthy while *L. hansoni* and its hybrids with *L. martagon album* (Marham and Backhouse) was uniformly virus-free in tests with 50 plants from 5 localities. *L. myriophyllum superbum* and *L. nepalense*, grown in a greenhouse from wild bulbs of Indian origin, were also sound.

Among the conclusions arising out of these data may be mentioned the satisfactory results of systematic attempts at the avoidance of

mosaic by isolation. *L. hansoni* and its hybrids would appear to be definitely resistant to the disease, or equipped with some property facilitating escape from it. The high level of performance of doubly infected *L. candidum*, George C. Creelman, *L. regale*, and *L. sargentiae* indicates the absence of any close correlation between double infections and lack of vigour.

McWhorter (F. P.). **The distribution of zilverblad or white streak in Narcissus plantings on the west coast.**—*Plant Dis. Reptr*, xxiv, 1, pp. 20–24, 1940. [Mimeographed.]

Test plots maintained in Oregon for three years and mild forcing tests have shown that the white streak symptoms ('zilverblad' in Holland) developing on *Narcissus* [*R.A.M.*, xix, p. 96] are the end expression of obscure white or purple streaks, both of which may appear on the same plant. Such plants, if subjected to rather high temperatures during the growing period, either out-of-doors or in the greenhouse, become typical white-streak plants. Thus, white streak is the chief and final symptom of the disease complex previously referred to by the author as 'decline disease' [ibid., xvii, p. 684]. Evidence obtained independently at Cornell and in Oregon showed that the disease is transmissible and probably of virus origin.

As the condition causes bulb stocks to 'run out', it is of considerable economic importance. It induces very early maturity, the plants ripening shortly after blooming and the normal growth period of the bulb thus being circumvented. The distribution of the disease among the *Narcissus* varieties cultivated on the west coast of the United States from Santa Cruz to northern Washington is described and tabulated. Of the large trumpet varieties 69 per cent. showed the disease while only 12 per cent. of the varieties representing all the other groups exhibited typical symptoms. The disease appears to be of comparatively recent origin, the King Alfred variety, introduced in 1899, being the oldest variety that exhibited significant infection in every lot examined.

Weiss (F.). **Ovulinia, a new generic segregate from Sclerotinia.**—*Phytopathology*, xxx, 3, pp. 236–244, 3 figs., 1940.

Latin and English diagnoses are given of *Ovulinia azaleae* n.g., n.sp., the agent of a destructive flower blight of *Rhododendron mucronatum*, *R. pulchrum*, *R. simsii*, *R. obtusum*, and *R. catawbiense* in the southern and south-eastern United States, and experimentally pathogenic to a wider host range, including *Kalmia* [*latifolia*] and *Vaccinium* spp. [*R.A.M.*, xiv, p. 365; xviii, p. 742].

The fungus is characterized by stipitate, urceolate to cyathiform, flat, tawny olive to snuff-brown apothecia, 2 to 5 mm. in breadth, with a scaly, granulose, or hirsute margin, arising singly or in groups of 2 to 3 (rarely up to 8) in the late winter or early spring from a sclerotium lying on or immediately below the soil; a clay- to cinnamon-coloured, glabrous, pruinose, erect, slightly curved, or sinuous, filiform stipe, 2 to 3 or up to 15 to 18 by 1 to 1·5 mm., occasionally furnished with one or more rhizoids; a russet- to walnut-brown, somewhat pruinose hymenial surface; cylindrical asci, 140 to 260 by 9 to 14 (average 180 by

12) μ, containing eight uniseriate, ellipsoid, non-septate, hyaline, usually uni- to triguttulate ascospores, 10 to 18 by 8·5 to 10 (16·3 by 9·3) μ; terete, septate paraphyses, mostly simple; obovoid, hyaline conidia, 40 to 60 by 21 to 36 (50 by 28) μ, including the basal appendage, or (under humid conditions) clavate to piriform, up to 72 μ in length, produced singly on short, simple branches protruding from the host surface and separating from the conidiophores by means of a disjunctor cell remaining attached to the conidium (at this stage a thin weft is formed over the surface of the host organ, whence the conidia are promptly disseminated by insects or meteoric water, or they may germinate *in situ*); globose spermatia, 3 to 3·5 μ in diameter, produced at the tips of fusoid, caespitose hyphae, 10 to 12 by 3 μ, appearing (usually singly but sometimes in short chains) simultaneously with the circular to elliptical or irregular, cupulate, black sclerotia, smooth on the concave surface, verrucose to rugose on the convex, 2 to 5 by 3 to 10 by 0·5 to 1·5 mm., formed within the invaded host tissues but separable therefrom at maturity.

O. azaleae makes good growth at 18° to 22° C. on 2 per cent. potato dextrose agar at P_H 6, forming a coarse, tough, matted, greyish-white to pale fawn mycelium, becoming stromatoid and darkening later; sclerotia and spermatia, but no conidia, are also produced on bean-pods and barley or wheat kernels.

Ovulinia is obviously related to *Sclerotinia* in its sclerotial and apothecial characters, as well as in its pathogenesis, but the erection of a new genus was necessitated by the entirely atypical mode of conidial production in the *Rhododendron* fungus.

Akai (S.). **On the pathological histology of hypertrophied leaves of Camellia sasanqua caused by Exobasidium camelliae var. gracilis.**—*Ann. phytopath. Soc. Japan*, ix, 2, pp. 61–68, 1 pl., 2 figs., 1939. [Japanese, with English summary.]

A description is given of the histological changes occurring in the hypertrophied foliage of *Camellia sasanqua* attacked by *Exobasidium camelliae* [*R.A.M.*, xviii, p. 528] var. *gracilis*.

Ghillini (C. A.). **Cancro delle Gardenie.** [*Gardenia* canker.]—*Riv. R. Soc. Tosc. Ortic.*, xxiv, 7–8, pp. 145–149, 1939. [Abs. in *Biol. Abstr.*, xiv, 3, p. 524, 1940.]

An illustrated account is given of a stem canker of *Gardenia* observed at Bologna and ascertained to be due to *Phomopsis gardeniae* [*R.A.M.*, xix, p. 350]. Inoculation experiments with pycnospore suspensions of the fungus gave positive results.

McKenzie (M. A.), Jones (L. H.), & Gilgut (C. J.). **Phomopsis gardeniae in relation to Gardenia culture.**—*Plant Dis. Reptr*, xxiv, 3, pp. 58–62, 1940. [Mimeographed.]

Details are given of observations and inoculation tests at the Massachusetts Agricultural Experiment Station, the outcome of which indicated that the agent of *Gardenia* canker, *Phomopsis gardeniae* [see preceding abstract], enters exclusively through the leaf, stem, and root wounds, and remains localized in the region of malformation or distor-

tion, cuttings from diseased plants being largely free from infection. Of primary importance in the control of the canker is extreme care in the handling of cuttings, the use of a sharp knife being essential to avoid tearing the tissues. With proper precautions it should not be necessary to sacrifice infected blossoming plants immediately, if the value of the flowers warrants delaying their destruction until the end of the flowering period.

Pollacci (G.) & Bergamaschi (M.). **Azione delle vitamine sulla germinazione dei semi di Orchidee.** [The action of vitamins on the germination of Orchid seeds.]—*Boll. Soc. ital. Biol. sper.*, xv, 2, pp. 326–327, 1940.

Following up the studies of the first-named author, Burgeff, and Cappelletti on the influence of the metabolic products of the appropriate symbionts [(?) including *Corticium catonii*] on the germination of orchid seeds [*R.A.M.*, xix, p. 111], the writers grew seeds of *Oncidium pulvinatum* on the medium of Knudson-Burgeff, with and without the addition of (*a*) 0·2 per cent. vitamin C (ascorbic acid) and (*b*) filtrates of symbionts (specific or otherwise) or the living fungus. The development of these cultures was entirely satisfactory, in contrast to that of the seeds on the nutrient medium without accessory substances, which ceased growth at the protocorm stage. The addition of traces of vitamin C (crystallized) induced a resumption of the normal functions. Seeds of *Cattleya labiata autumnalis*, though capable of germination on the nutrient medium, also benefited in the later stages of growth by treatment with vitamin C or the fungal filtrates. Further experiments are in progress to determine the exact nature of the connexion between vitamin C and the metabolic products of the fungi concerned.

Fischer (G. W.). **Grass diseases occurring in the Pullman Nursery Unit of the Soil Conservation Nurseries, Pullman, Washington, during 1939.**—*Plant Dis. Reptr*, xxiv, 5, pp. 108–114, 1940. [Mimeographed.]

Alphabetical host and pathogen lists are given of the fungal diseases affecting grasses in the Pullman (Washington) Nursery Unit of the Soil Conservation Nurseries during 1939.

Sprague (R.). **A third species of Mastigosporium on Gramineae.**—*Mycologia*, xxxii, 1, pp. 43–45, 1 fig., 1940.

In accordance with Articles 16 and 60 of the present International Rules of Botanical Nomenclature, which stipulate that varietal names raised to specific rank are invalid when a specific epithet is available, the author proposes a new combination, *Mastigosporium rubricosum* (Dearn. & Barth.) Sprague for *Fusoma rubricosa*, the name *M. calvum* [*R.A.M.*, xviii, p. 34] previously proposed for this fungus being relegated to synonymy.

A new species, named *M. cylindricum*, was found on living leaves of *Bromus vulgaris* in Douglas County, Oregon, where it is probably native. It is described [with a Latin diagnosis] as causing brown, elliptical to elongate, finally confluent and mottled spots mostly along the sides and tips of the leaves. The mycelium is mostly endophytic,

somewhat coalesced beneath the upper leaf surface, coarse, and hyaline or lightly tinted. The short and stout conidiophores produce spores by expansion of the distal portion and eventual abscission. The spores are straight-sided, slightly or scarcely constricted at the septa, cylindrical with rounded, blunt ends, typically capsular, hyaline, triseptate, and measure 25 to 32 by 4·5 to 5·9 μ.

Meier (A. A.) & Krivodubskaya (Mme N. I.). Меры борьбы с цветочной плесенью Красного Клевера. [Methods for controlling the anther mould of Red Clover].—*Bull. Pl. Prot., Leningr., 1939*, 1, pp. 125–129, 1939. [Received April, 1940.]

The primary infection of red clover with anther mould (*Botrytis anthophila*) [*R.A.M.*, xviii, p. 115] is stated to occur through the seed, the fungus becoming systemic throughout all aerial parts of the plants. The mycelium enters the parenchymatous cells under the seed coat and near the radicle between the cotyledons, and fungicidal solutions must be able to penetrate the seed coat in order to kill the mycelium inside the seed. Of the seed treatments tested in the present study, the best results were obtained with meranin [loc. cit.] and the preparation NIUIF-1 (containing 1 per cent. organic mercury), each used at a strength of 1 in 1,000 (NIUIF-1 also at 1 in 400) for an immersion period of one hour. The former reduced infection in 20-day-old plants from 26·8 per cent. in the untreated control to 1·6, and the latter reduced infection in 9-day-old plants from 24 per cent. in the control to 11 using the 1 in 1,000 solution, complete elimination being obtained with the 1 in 400. The meranin treatment also killed all other moulds observed by the authors on red clover seeds, including *Fusarium poae*, *F. herbarum* [*F. avenaceum*], and *Nigrospora oryzae*. Neither treatment had any adverse effect on germination. Negative results were obtained with the usual wet and semi-dry treatments with formalin.

Jones (F. R.) & Weimer (J. L.). **Three anthracnoses of Alfalfa.**—*Plant Dis. Reptr*, xxiv, 2, pp. 30–31, 1940. [Mimeographed.]

Two species of *Colletotrichum* were found on lucerne showing extensively blackened stems and partial defoliation in a nursery in Georgia. One, with straight spores mostly 14 to 18 μ long, was tentatively identified as *C. destructivum* [*R.A.M.*, xiv, p. 85], while the other, with straight spores about 25 μ long, appeared to be identical with *C. graminicola* [loc. cit.]. *C. trifolii* [ibid., xiii, p. 168] commonly occurs on lucerne in Georgia.

Veresciaghin (B.). **Bolile cryptogamice pe ramurile şi tulpinile pomilor roditori.** [Fungous diseases of stems and branches of fruit trees.]—*Bul. agric. Basarabia, 1940*, 1, pp. 11–12, 1940.

This is a preliminary account of the author's observations during many years in Bessarabia and Bukovina on diseases of fruit trees. The diseases mentioned include the following: *Sphaeropsis malorum* [*Physalospora obtusa*: *R.A.M.*, xv, p. 202] is widespread, mostly on apples; *Erwinia amylovora* is reported to occur on both apples and pears, mostly in Bukovina [ibid., xvii, p. 656]; *Clasterosporium carpophilum* attacks apricot trees seriously; *Sclerotinia fructigena* occurs on apples,

S. cinerea [*S. laxa*] on plums, and *S. laxa* on apricots; *Melanconium juglandinum* and *Pseudomonas juglandis* are found on young and old walnut trees, respectively; and finally *Bacterium tumefaciens* is stated to be prevalent.

Sherbakoff (C. D.) & Andes (J. O.). **Apple and Pear fire blight.**—*Circ. Tenn. agric. Exp. Sta.* 64, 4 pp., 1939. [Abs. in *Chem. Abstr.*, xxxiv, 8, p. 2522, 1940.]

Blossom blight of apples and pears [*Erwinia amylovora*] may be sufficiently reduced to assure a full crop by two applications of 1–3–50 Bordeaux mixture, one in the middle and another in the late stages of flowering. Further, infected areas should be excised and painted with a mixture of 2 oz. glycerol, 4 oz. wintergreen oil [methyl salicylate], 2 oz. ethyl alcohol, and 1 qt. methyl alcohol, to which is added 4 oz. cobalt nitrate crystals, or a zinc chloride solution may be used.

Chittenden (E.). **Use of borax sprays in the control of internal cork of Apples.**—*N.Z. J. Sci. Tech.*, A, xxi, 5, pp. 303–304, 1940.

Satisfactory control of internal cork in Cox's Orange, Delicious, Sturmer, Jonathan, and other apple varieties were obtained in the Nelson district of New Zealand by spraying with hydrated borax [*R.A.M.*, xix, p. 29] or rasorite (a natural borax containing 44.5 per cent. boric oxide equivalent) at a concentration of 0·10 per cent., the incidence of the trouble being reduced in one orchard from 53 per cent. to nil at this minimum strength, no increase in which appears to be called for. No difficulty was experienced in the combination of either material with other sprays, including lead arsenate, lime-sulphur, ialine, colloidal sulphur, and spreaders (kayso, kaysene, and lethalate), and the introduction of hydrated borax into the commercial spray programme for November is recommended as an alternative to soil top-dressings of borax or rasorite. There were no deleterious effects on the leaves or fruits as a result of the treatments.

Thomas (H. Earl) & Rawlins (T. E.). **Some mosaic diseases of Prunus species.**—*Hilgardia*, xii, 10, pp. 623–644, 9 figs., 1939.

The following diseases of the mosaic type are described [and the symptoms illustrated] on species of *Prunus* in central California [cf. *R.A.M.*, xviii, p. 260]. Two types of mosaic, both transmissible by grafting, were observed on sweet cherry: one, which is characterized by chlorotic blotches, lines, or rings, is more apparent on rootstocks than top plants, and comparatively mild on the more common orchard varieties; the other, designated 'cherry mosaic 1', is widely distributed in the State, and transmissible to peach and apparently to other species. The latter is characterized by large chlorotic blotches on the young leaves followed by distortion, the chlorotic areas often dropping out and many leaves falling by midsummer. Later in the season, a milder mottling of the leaves with little or no distortion is often observed and compact tufts of small and sometimes distorted leaves from latent buds on large branches of older trees rather constantly appear, the fruit being scanty and in some varieties somewhat misshapen.

On almond a common symptom of mosaic is a small, pale-green to

white, more or less star-shaped spot on the leaf blade, or at other times large chlorotic blotches or bands, usually with little or no distortion. This latter symptom picture, designated by G. L. Stout as 'calico', was transmitted to peach and cherry, with rather strong symptoms on the latter.

At least two types of mosaic were observed on Japanese plum (*P. salicina*). One, referred to as the Vacaville plum mosaic, has so far been found only in one locality on the variety Santa Rosa, and is similar to a mosaic reported from Kentucky [ibid., xii, p. 454]. Its symptoms are mild, consisting in pale green blotches, lines, and rings in the leaf blade; transmitted by buds to peach seedlings a mild mottling was produced. During five years' observation the disease did not appreciably reduce the vigour of the trees. The other type of mosaic on plum was found on several varieties, the typical symptoms on Santa Rosa being rather small, completely chlorotic spots, more numerous towards the distal end of the leaf blade.

A mosaic of Standard prune produces few or many small chlorotic spots, often more numerous towards the tip of the leaf, coalescing to cause distortion and dropping-out of parts of the leaf blade. The disease is more apparent in mid-season than in early spring and in the greenhouse than out of doors. It was successfully transmitted to peach. A mosaic found on Sugar prune, though similar to that of Standard, is not identical with it and both diseases are distinct in appearance from that of Italian prune in western New York [ibid., xvi, p. 330].

Apart from the destructive mosaic disease of peaches occurring in Texas and elsewhere [ibid., xvi, p. 543], one distinct disease, the 'asteroid spot', was found in southern California [ibid., xvii, p. 609], and another, found only at Winters, California, is designated Winters peach mosaic. The symptoms of the latter are most noticeable at the beginning of the growing season: pale green to pale yellow, oblong, feather-edged blotches appear along the midvein and larger lateral veins of young leaves, followed by distortion of the lamina and dropping out of chlorotic parts. Later in the season mild symptoms appear, definite chlorotic lines and rings being rare. On severely affected branches, the leaf buds often push out pale leaf tips, which do not develop further for several weeks. Eventually these branches die back or produce compact clusters of small, narrow leaves, often somewhat curved laterally and not conspicuously mottled. The flowers show no symptoms, while fruit yields vary proportionally to the stage of development of the disease. Winters peach mosaic occurs naturally on peach, apricot, and probably almond; it was transmitted by grafting to *P. andersonii*, apricot, cherry, almond, *P. mume*, *Kerria japonica*, and Ragged Robin rose. Symptoms on several species and the results of cross-inoculations indicate that almond calico, cherry mosaic 1, and Winters peach mosaic may be related, but certain other symptoms and the failure to immunize peach seedlings against Winters peach mosaic by the use of milder mosaic viruses seem to show that they are not identical.

Chester (K. S.). **Virus diseases of the stone fruits.**—*Plant Dis. Reptr*, xxiv, 4, pp. 74–78, 1940. [Mimeographed.]

A table is given showing the symptoms on fruits and leaves of 13

recognized virus diseases of stone fruits (including eight of peach, three of cherry, and two of plum), the growth habit of affected trees, the range of infection in the United States, and the States in which quarantines are imposed. Brief explanatory comments are added. A list is appended of a further eight diseases, believed to be of virus origin, reported from the United States but excluded from the table on account of insufficient information as to their etiology. [In *Plant Dis. Reptr*, xxiv, 6, p. 132, 1940, the author publishes certain emendations by W. D. Valleau and L. Hutchins to his descriptions of plum mosaic and phony peach, respectively.]

Thomas (H. Earl), Gilmer (R. A.), & Scott (C. E.). **Rust of stone fruits.**—*Mon. Bull. Calif. Dep. Agric.*, xxviii, 5, pp. 322–327, 1939.

Examination of numerous collections of *Tranzschelia* [*Puccinia*] *pruni-spinosae* [*R.A.M.*, xviii, p. 745] on various stone fruits from different parts of California showed all to belong to the *discolor* type [ibid., xvii, p. 756]. Inoculations on contrasted half-leaves of peach and prune with uredospores from these hosts showed that at least two distinct physiologic forms of the fungus are present in central California. When whole, detached leaves were used for the inoculations, uredospores from prune gave marked infection on prune, moderate on plum, slight on apricot, and no infection on almond, cherry, and peach. Aecidiospores from cultivated *Anemone* growing next to a prune orchard gave similar results. Spores from peach gave strong infection on peach, slight on apricot and plum, and none on prune, almond, and cherry. The evidence suggests that yet other physiologic forms may be present where almond and apricot are severely affected.

The fungus appears to overwinter in three ways in California, in twig cankers on peach trees, in the form of uredospores on the bark or buds, and on living, infected leaves, which remain attached to the tree. Infection of cultivated *Anemone* is uncommon locally, and does not appear to be an important source of attack on fruit trees.

Louw (A. J.). **Gum-spot disease of stone fruits.**—*Fmg S. Afr.*, xv, 168, pp. 105–108, 128, 6 figs., 2 graphs, 1940.

During the past two years gum spot of stone fruits (*Clasterosporium carpophilum*), which previously appears to have caused little serious damage in South Africa, has assumed epidemic proportions on apricots in the French Hoek area and on apricots and peaches in the Paarl district.

Leaf infection was observed to take place directly through the epidermis and equally readily on the upper and lower surfaces. Relatively long periods of continuous wetting are necessary for infection to occur [cf. *R.A.M.*, xvii, p. 257], and the less favourable the temperature the longer the wetting period required. Dissemination was found to depend exclusively on moisture, and to be effected, apparently, by means of the downward washing of spores over the twig surface during rain, lateral distribution occurring only when rain is accompanied by a strong wind.

All the chief varieties of stone fruits tested were found to be susceptible. Elberta peaches and Japanese plums [*Prunus salicina*] yielded no positive shoot infections, but the fruits and leaves were readily

infected. Apparently, the degree to which various stone fruits are subject to the disease largely depends on their respective growing periods in relation to climatic conditions. Almonds, Alpha apricots, and the early peach varieties, King Edward VII and Early Dawn, are highly susceptible, though later varieties growing between affected early ones generally remain healthy.

Spraying experiments [details of which are given] showed that one winter application of home-made Bordeaux mixture (4–6–50 plus ¼ lb. ortho-spreader) or verderame (5 lb., with ¼ lb. ortho-spreader per 50 gals. water) gave adequate control on peaches, if made before the arrival of the winter rains. Infected wood should be removed during winter pruning and burnt.

Smith (W. H.). **Further observations on physiological breakdown in stored Plums.**—*J. Pomol.*, xviii, 1, pp. 74–87, 4 graphs, 1940.

In storage experiments with Victoria plums at the Ditton Laboratory, East Malling, Kent, similar results were obtained to those previously reported for Monarch plums [*R.A.M.*, xix, p. 105], giving support to the view that jellying and internal browning are distinct types of injury arising from different causes. When stored for periods from three to five weeks at a range of temperatures from 65° to 31° F., Victoria plums showed a minimum amount of total breakdown at about 34°; at higher temperatures it increased owing to a rise in the amount of jellying, and also at lower temperatures owing to a rise in the amount of internal browning, jellying falling practically to nil at 31°. The advance of jellying was accelerated, while internal browning was reduced, by greater maturity at picking time. Internal browning was checked, and jellying only slightly increased, by interrupting a 35 days' storage at 31° at the 17th day for an intermediate exposure to a temperature of 65° for four days. Pre-storage treatment of Monarch plums with ethylene (1/680 for two days at room temperature) reduced the amount of internal browning after 22 days' storage at 31°, 34°, and 40°, to nil, but induced severe jellying at 31° and 34°, where it did not otherwise occur, and increased the amount of it at 40° to 100 per cent. A gas mixture containing 2·5 per cent. carbon dioxide, 2·5 per cent. oxygen, and 95 per cent. nitrogen suppressed jellying in Victoria plums stored at 37°, but induced internal browning, which does not otherwise occur at that temperature. It is suggested that jellying is brought about by a modification of the senescent metabolism usually occurring at ordinary temperatures and induced by exposure to cold over a certain range of temperatures. It does not seem to cause actual death of tissue except in the most advanced stages. Internal browning, on the other hand, is the first visible manifestation of a specific type of injury that has already killed the tissue.

Gigante (R.). **Cancri prodotti dal freddo sopra rametti di Susino.** [Cankers produced by the cold on Plum branches.]—*Boll. Staz. Pat. veg., Roma*, N.S., xix, 4, pp. 453–472, 1 pl., 15 figs., 1939. (Issued March, 1940.)

A detailed description is given of cankers produced by the action of cold weather on branches of the Shiro plum variety in Italy. The simplest type consisted of a longitudinal cracking, but in more complex

forms, true cankers were produced, in which the cortical tissues were irregularly arranged, contained numerous cavities, and showed woody areas surrounded by a cork ring.

BRIEN (R. M.). **Brown-spot (Alternaria passiflorae Simmonds). A disease of the Passion-Vine in New Zealand.**—*N.Z. J. Sci. Tech.*, A, xxi, 5, pp. 275–279, 4 figs., 1940.

Brown spot of the passion vine (*Passiflora edulis*) due to *Alternaria passiflorae* [*R.A.M.*, xix, p. 294] has been present in New Zealand for several years and in severe cases causes defoliation, shrivelling of the fruits, reduction in bearing capacity, and diminution of yield. Inoculation experiments with pure cultures of the organism from potato dextrose agar resulted in the development of typical symptoms on the foliage, stems, and fruits. Control measures should include the excision and destruction of diseased material, pruning and training the vines to allow of spray penetration, and two to three applications of 3–4–50 Bordeaux mixture from the commencement of new growth in early October onwards.

MARTIN (H.). **The incorporation of direct with protective insecticides and fungicides. IV. The evaluation of the wetting and spreading properties of spray fluids.**—*J. Pomol.*, xviii, 1, pp. 34–51, 1940.

Twenty different water-soluble products of potential value as spray spreaders, including some alkyl sulphates and several proprietary products, such as sulphonated lorol, lethalate, igopon T and A, sapamine MS, and others, all containing active constituents of long chain structure, were examined in further laboratory studies [*R.A.M.*, xvii, p. 542]. It was found that a similar linear relationship exists between the advancing and receding contact angles made by solutions of many surface-active substances; the occurrence of important exceptions to this rule, however, justifies the view that these two values are distinct entities. The area of spread of droplets on a given surface is related to functions both of the contact angle and of the spreading coefficient on that surface, and is equally well determined by either the advancing or equilibrium contact angles. The determination of area of spread is, however, considered to be of doubtful value in assessing properties because of the experimental difficulties involved in dealing with small droplets and the uncertainty of the contact angles assumed by larger droplets. The maximum initial retention is determined by contact angle and spreading coefficient, and similar correlations are obtained when either the receding contact or the equilibrium contact angles are used in the estimation of the correlation coefficients. These relationships appear also to exist in spreaders of other than the long chain classes. This method of determination has also been applied to heterogeneous spray systems and a satisfactory agreement has been found with the figures obtained in field trials of the same sprays. It is therefore suggested that the laboratory determination of the amount of spray retained under standard conditions upon a given vertical surface provides a reliable method for the evaluation of spray spreaders and is suitable for the routine standardization of the wetting and spreading properties of compounded spray materials.

Everitt (E. L.) & Sullivan (M. X.). **The fungistatic and fungicidal action of certain organic compounds.**—*J. Wash. Acad. Sci.*, xxx, 3, pp. 125–131, 1940.

Some 50 organic sulphur compounds were tested for their fungistatic and fungicidal action against Sabouraud's dextrose agar cultures of *Fusarium oxysporum* and *F.* [*bulbigenum* var.] *lycopersici*, the agents of potato and tomato wilt, respectively, *Aspergillus fumigatus*, a pathogen of man, *A. niger*, responsible for foodstuff spoilage and occasionally infecting human beings, and Fleming's bacterial-inhibitory *Penicillium* [*R.A.M.*, xiv, p. 464]. Phenyl thioarsenite, 4-chloro-2-nitrophenyl sulphur amine, 1, 2 naphthoquinone-4-sodium sulphate, and protylin or sulphanilamide were fungistatic at the rates of 12·5, 12·5, 12·5, and 25 mg. per 100 c.c., respectively, and mercaptobenzothiazole and phenylbenzothiazole were fungicidal, both at 10 mg. Mercaptobenzothiazole is the most effective of all the preparations used in the experiments, inhibiting the growth of all the test organisms at a strength of 50 to 100 parts per million; it is inexpensive and plentiful supplies are available. The therapeutic value of the various compounds requires further testing on laboratory animals before definite recommendations can be made, but preliminary oral and intraperitoneal experiments on guinea-pigs with mercaptobenzothiazole gave little or no evidence of toxicity.

Steinmetz (F. H.) & Gashwiler (J. S.). **Some recent observations and reports on Eelgrass in Maine.**—*Plant Dis. Reptr*, xxiv, 5, pp. 116–118, 1 map, 1940. [Mimeographed.]

Observations and records from 1937 to 1939 on the status of the eelgrass (*Zostera marina* var. *stenophylla*) beds in Maine are stated to point to the rehabilitation of the plants, which are producing seeds at several points along the coast and should shortly, in the absence of a recrudescence of wasting disease [*Labyrinthula* (?) *macrocystis*: *R.A.M.*, xvi, p. 697; xix, p. 35], completely regain their former condition.

Wilkins (W. H.) & Patrick (Sheila H. M.). **The ecology of the larger fungi. IV. The seasonal frequency of grassland fungi with special reference to the influence of environmental factors.**—*Ann. appl. Biol.*, xxvii, 1, pp. 17–34, 5 graphs, 1940.

Further observations during 1937 on grassland fungi in three stations (clay, chalk, sand) near Oxford [*R.A.M.*, xviii, p. 405] showed that their seasonal variation is conditioned by environmental factors, chiefly temperature and soil-water content. The number of fungus sporophores produced was found to be in direct relationship to these two factors, and it is suggested that the well-known summer and autumn fungus seasons are due to the fact that only at these two periods of the year does a synchronization of favourable factors occur. Lists are given of the seasonal distribution of the fungi in the three stations and of the species showing seasonal frequency of individuals.

Lochhead (A. G.). **Qualitative studies of soil micro-organisms. III. Influence of plant growth on the character of the bacterial flora.**—*Canad. J. Res.*, Sect. C., xviii, 2, pp. 42–53, 1940.

The results of this laboratory study show that the rhizospheres of red

clover [*Trifolium pratense*], mangels, oats, tobacco, maize, and flax are richer in Gram-negative short rods and poorer in Gram-positive short rods, coccoid rods, and spore-forming bacteria than control soils at a distance from the plants. Comparing the bacterial floras of the rhizospheres of the Bison and Novelty flax varieties, resistant and susceptible to wilt (*Fusarium lini*), respectively, and of the tobacco strains RH. 211 and CH. 38, resistant and susceptible to black root rot (*Thielaviopsis basicola*), respectively, it appeared that Gram-negative short rods were relatively more abundant, and coccoid rods and spore-forming bacteria less numerous in the rhizosphere of the susceptible than in that of the resistant plants. These results suggest the possibility that resistance to soil-borne diseases may be linked up with a selective action of root excretions upon the saprophytic microflora, favouring types antagonistic towards pathogenic organisms [cf. *R.A.M.*, xviii, p. 50].

Lochhead (A. G.), Timonin (M. I.), & West (P. M.). **The microflora of the rhizosphere in relation to resistance of plants to soil-borne pathogens.**—*Sci. Agric.*, xx, 7, pp. 414–418, 3 figs., 1940.

Plate counts of micro-organisms from the rhizospheres of varieties of flax and tobacco, resistant or susceptible to wilt [*Fusarium lini*] and black root rot [*Thielaviopsis basicola*], respectively, showed that rhizospheres of susceptible varieties harboured larger numbers of bacteria and fungi than those of resistant. Thus, the number of fungi found in 1 gm. rhizosphere soil of the resistant flax variety Bison and tobacco RH. 211 field plants was 48,500 and 239,000, respectively, as compared with 75,600 and 939,700, respectively, for the susceptible Novelty flax and CH. 38 tobacco. The ratios of the rhizosphere population to that of the control soil were definitely higher under dry (30 per cent. saturation) than under moist (60 per cent.) soil conditions. In the case of Actinomycetes the differences between rhizosphere and control soil and between varieties were less apparent. The results of qualitative studies of bacterial groups in plant rhizospheres have already been noticed from another source [see preceding abstract]. Organisms isolated from the rhizosphere of the resistant flax variety on various media showed an increase of 83 per cent. over the control in bacterial types for which amino-nitrogen is either stimulative or essential and one of 71 per cent. in those influenced by a combination of growth factors including thiamin and biotin, while isolations from the susceptible variety showed corresponding increases of 325 and 143 per cent. Similar tendencies were noted in the case of tobacco varieties.

Björkman (E.). **Om mykorrhizans utbildning hos Tall- och Granplantor, odlade i näringsrika jordar vid olika kvävetillförsel och ljustillgang.** [On the development of mycorrhiza in Pine and Spruce seedlings grown in rich soils with a varying supply of nitrogen and access of light.]—*Medd. Skogsförsöksanst., Stockh.*, 32 (2), pp. 23–74, 23 figs., 7 graphs, 1940. [English summary.]

A detailed, tabulated account is given of an experimental study, forming part of an investigation planned by H. Hesselman (*Bot. Notiser, 1939*) and to be further pursued by him, on root and mycorrhiza development in one- and two-year-old pine (*Pinus sylvestris*) and spruce

(*Picea excelsa*) [*P. abies*] seedlings, grown in eight different soils, mostly mulls rich in nutrients, under varying intensity of light and receiving different amounts of nitrogen up to 81 gm. ammonium nitrate per 7 l. pot.

In all forms of humus the roots were shorter and less branched in the series supplied with large amounts of nitrate, very high doses of which further induced coarsening and the formation of swollen, claviform tips. In heavily shaded pots the roots were poorly developed and sparsely ramified. Root hairs were more numerous (especially in spruce) in cultures with added nitrate and heavily shaded than in those otherwise treated. The short roots (0·5 to 5 mm. in length) were usually single or little branched, most of them (60 to 90 per cent.) assuming form A (ordinary, often furcate, as in pine, or bushy, as in spruce, without hyphal strands) and B (like the foregoing, but with a pseudomycorrhizal structure in the main basal part). Type C of Melin, formed by *Boletus* spp. [*R.A.M.*, iii, pp. 358, 541], was found in the present series of tests only in occasional pine plants in 'mor' and sand (humus mixed with sand in a volume ratio of 1 : 2). Type Da, characterized by thin, blackish-brown hyphae, forming a secondary mantle outside an original mycorrhiza (*M*[*ycelium r*[*adicis*] *atrovirens*) [ibid., xviii, p. 700], and Dn, with coarser hyphae profusely radiating from the surface (*M. r. nigrostrigosum*) [ibid., xviii, p. 701] were only sparingly represented in the available material. Various other types of mycorrhiza were found in the other soils tested (mull-oak wood, mull-spruce wood, mull-alder wood, high calcium mull-spruce wood, 'mor and sand') and are described.

The morphological and anatomical structure of the mycorrhiza was not as a rule appreciably modified by the addition even of large quantities of nitrate, or by restricted illumination. In 'mor', however, intracellular infection was reduced in the series given 9 gm. nitrate per pot, while in mull-alder wood the plants supplied with 27 gm. produced a peculiar type of mycorrhiza with a soft, pale yellow mantle round the swollen lateral and short roots. Mycorrhizal development was equally good at 23, 49, and 76 per cent. incident radiation, measured by Aurén's thermoelectric solarimeter (*Medd. methydr. Anst. Uppsala*, 16, 1937), both in spruce and pine. On the other hand, no mycorrhiza were formed by one-year-old seedlings at 6 to 8 per cent., and in the case of pine development was very poor at 12 per cent. Spruce seedlings grown in the shade of *Aegopodium podagraria* and *Scrophularia nodosa* showed an average of only two mycorrhiza per plant, as compared with 47 in the controls. In most soils the mycorrhizal percentage reached the maximum value of 60 to 90 per cent. at 23 per cent. radiation. Pseudomycorrhiza occurred in large numbers in spruce and pine seedlings grown in light weaker than 23 per cent., but their parasitic mycelium did not appear to be very active, nor was the *M. r. atrovirens*, with its parasitic secondary mantle, consistently more prevalent in the heavily shaded cultures. In the combined series of tests (nitrogen and light factors both varied), the mycorrhizal percentages rose more slowly in the high-nitrate pots with increasing radiation than in those given less of the nutrient. There was, however, no general injury or retardation in growth at a given radiation from nitrate applications at the rates of 3 and 9 gm. per pot.

Steinberg (R. A.) & Thom (C.). **Chemical induction of genetic changes in Aspergilli.**—*J. Hered.*, xxxi, 2, pp. 61–63, 1940.

In further studies on the development of genetic changes in *Aspergillus* through the influence of nitrite [*R.A.M.*, xix, p. 37], *A. nidulans*, *A. fumigatus*, *A. alliaceus*, *A. fischeri*, *A. variecolor*, and *A. flavus*, in addition to *A. niger* and *A. amstelodami*, were grown in a mannitol-sodium nitrite solution. In this medium *A. fumigatus* gave rise to three types of sterile mutants, one with long aerial hyphae completely filling the tube, another with short aerial hyphae, and a third virtually devoid of aerial hyphae, tumulose, of a rather darker colour than the others, and tending to change into the second type. A form resembling the last-named was also produced by *A. niger*. An asexual mutant derived from *A. fischeri* would undoubtedly have been referred, on the basis of its profusion of conidia, to *A. fumigatus* had its origin not been known. A mutant of *A. variecolor*, unlike the parent strain used in the experiments, formed a continuous growth over the surface of Czapek's agar slants. Neither in this species nor in *A. amstelodami* was it possible entirely to suppress perithecial formation by chemical means, though in some of the others the production of both perithecia and sclerotia was definitely inhibited. The similarity in the response of these two structures to nitrite treatment is considered to point to a far-reaching morphological and physiological agreement between them. Conidial production, as already indicated, was not influenced in a uniform manner by the treatment. It is estimated that at least 50 per cent. of the trials undertaken with nitrite treatment should yield mutants under appropriate conditions.

The nature of the carbon source would appear to influence, though not to determine, the development of mutants in nitrite solutions, only 40 per cent., for instance, being formed in one test with sucrose, as compared with 80 per cent. with mannitol.

Mutants of *A. niger* were also produced in solutions of mannitol or sucrose with potassium iodide and ammonium nitrate or ammonium chloride; with ninhydrin and ammonium chloride or sodium nitrate; with chloramine-T and ammonium chloride, ammonium nitrate, or sodium nitrate; and with formin or potassium bichromate. Though none of these compounds was as effective for the end in view as sodium nitrite, the basis of their action is obviously identical and consists in the elimination of amino nitrogen from protein.

Hellinga (J. J. A.). **On the effect of substances, produced by fungi, on the respiration of the tissue of Potato tubers. I and II.**—*Verh. Akad. Wet., Amst.*, xiii, 2, 30 pp., 8 graphs, 1940.

In connexion with studies at Hilversum, Holland, in 1939, on the increased intensity of respiration in plants attacked by an infectious disease, the effect of acid oatmeal agar culture extracts of *Gibberella saubinetti*, *Fusarium coeruleum*, *F. bulbigenum* var. *lycopersici*, and *F. trichothecioides* on the respiratory process in thin disks of Z. Eigenheimer, Bintje, and Muizen potato tubers was investigated by means of Warburg manometers.

Even at very low concentrations (1 in 10^5) the fungal extracts in-

duced a rapid and usually constant increase of the respiration rate, which was practically doubled in all cases immediately after the introduction of the extract into the vessels and remained at the same high level for the next two hours. The active substances proved to be thermostable, non-volatile, and insoluble in ether and chloroform, but subject to adsorption by activated coal (Norite) and Seitz EK asbestos filter plates; they may be restored to potency by rinsing out the adsorbent. The fungal extracts do not alter the respiratory quotient of the potato tissue. Evidence was obtained that the extracts act on the polyphenol-oxidase system but exert no influence on the residual respiration (amounting to 35 to 40 per cent.) unaffected by the addition of potassium cyanide solution (0·0005 M.). It is concluded from the results to date (the experiments are not yet completed) that the increase of oxygen consumption in potato tuber tissues under the influence of the specific fungal toxins is not caused by the oxidation of some added oxidizable substance.

Smith (K. M.) & Dennis (R. W. G.). **Some notes on a suspected variant of Solanum virus 2 (Potato virus Y).**—*Ann. appl. Biol.*, xxvii, 1, pp. 65–70, 1 pl., 1940.

A virus resembling potato virus Y but different from it in certain respects was found in 1935 affecting a White Burley tobacco plant. The disease was severely necrotic and superficially resembled that caused by the combined potato viruses X and Y on tobacco. Inoculations of White Burley tobacco and a number of other Solanaceous plants produced the characteristic necrosis only in some tobacco plants, while the rest developed a veinbanding typical of virus Y. Return inoculation to tobacco readily yielded the necrotic disease, except in the case of *Lycopersicum racemigerum* [*L. pimpinellifolium*] and *Salpiglossis variabilis*, from which only the veinbanding constituent could be reisolated. Neither phase could be recovered from *Schizanthus retusus*, *Solanum nodiflorum* (both susceptible to virus Y), or *Datura stramonium* [*R.A.M.*, xvi, p. 703]. The disease was transmitted to various potato varieties both by grafting and through sap, but only from President and International Kidney was it possible to reisolate the full necrotic disease; from all others the veinbanding phase only was recovered.

The virus causing the full necrotic phase was detected in sap heated to 50° C. for 10 minutes, but in a second experiment only the veinbanding phase survived at that temperature. In sharp contrast to virus Y, the veinbanding phase of the disease retained its infectivity at room temperature for 27 days or longer; the necrotic phase was lost after 24 hours' ageing. In filtration experiments the necrotic phase passed both the kieselguhr and the first membrane of A.P.D. 0·584 μ; only the veinbanding phase was capable of passing the membranes of 0·459, 0·302, and 0·215 μ. The necrotic phase was generally lost at dilutions of 1 in 800, although it appeared irregularly even below these; the veinbanding phase persisted in dilutions of 1 in 1,000 but not beyond. Only the veinbanding phase was transmissible by *Myzus persicae* and *Macrosiphum gei* [*M. solanifolii*]. Some evidence was obtained indicating that no cross-immunity exists between the virus in question and viruses A, X, and Y. It is concluded from these data that the virus is

presumably a variant of potato virus Y; it is suspected that the necrotic phase is due to a separate virus of very unstable character.

Naoumova (Mme N. A.). Инфекция Картофеля **Phytophthora infestans D.B.** от больных клубней. [The infection of Potatoes by *Phytophthora infestans* de Bary from diseased tubers].—*Bull. Pl. Prot., Leningr., 1939*, 1, pp. 94–102, 1939. [Received April, 1940.]

When tubers of the potato varieties Epicure and Lucia showing lesions of *Phytophthora infestans* [*R.A.M.*, xix, p. 300] of varying size were planted in pots in Leningrad in 1931, it appeared that the emergence depended on the number of healthy eyes in the tubers, as eyes situated within the lesions either rotted before sprouting or gave rise to sprouts which rotted before or soon after reaching the soil surface. In soil with high humidity (80 per cent. saturation) the germination of diseased tubers of Early Rose was greatly depressed, and the humidity factor is considered to be of greater importance than the degree of infection. Under natural conditions in the field infection is localized and does not spread from an infected top bud to other parts of the plant or from diseased seed tubers to the young daughter tubers. It was proved experimentally that the fungus in the remains of diseased tubers in the soil retains its virulence for at least one vegetative season and sporulates on the surface of the soil, when the remnants are brought up by cultural methods or by earthworms. It is suggested that the conidia thus formed and also those produced on infected sprouts are responsible for the infection of potato plants in the field. Diseased leaves and tubers collected in the autumn and stored for the winter in a dry state were successfully used in the following spring for inoculating potato stems, whereas diseased material left to overwinter in the plot gave no infection. This result is held to indicate that the overwintering of *P. infestans* in the field is not impossible under certain, as yet undetermined, conditions of temperature and humidity. The part played by oospores remains obscure.

Dykstra (T. P.). **The Potato wart eradication program in Pennsylvania.**—*Plant Dis. Reptr*, xxiv, 1, pp. 7–8, 1940. [Mimeographed.]

A comprehensive programme for the eradication of potato wart (*Synchytrium endobioticum*) [*R.A.M.*, xviii, pp. 704, 707; xix, p. 202] is now being carried out in Pennsylvania. Affected gardens are treated with ammonium thiocyanate or flaked copper sulphate at 2,000 or 2,500 lb. per acre, respectively. The treated gardens are planted with susceptible varieties during the first week in July, and the crops are harvested at the end of October, when each tuber is examined. If no infection develops in five years it is assumed that the fungus has been eradicated. When all known infections have been treated in any area, the regulations are modified to permit the growing of susceptible varieties under a special permit, the crop being gathered only under strict supervision. During the harvesting of susceptible varieties in treated gardens the author did not observe even one infected tuber.

At present, the potato wart quarantine areas in Pennsylvania include the whole of 4 townships and 40 scattered towns and villages in 13 counties, but the disease is wholly restricted to home gardens, of which

928 are known to be contaminated. Treatment has been applied to all known affected gardens in 8 areas, and after 5 years' checking of all plantings therein without finding any evidence of the disease, the Department of Agriculture has authorized the removal of the quarantine at these points. All the evidence indicates that the disease will in time be completely eradicated from the areas where treatment has been applied.

Jørstad (I.). **Potetkreftens utbredelse i Norge og fortegnelse over Potetsorter prøvd mot kreft.** [The distribution of Potato wart in Norway and a list of the Potato varieties tested against it.]—*Meld. Plantesykd. Land- og Hagebr., 1939*, 56 pp., 1 map, 1939.

Since the first detection of potato wart (*Synchytrium endobioticum*) in Norway in 1914, fresh cases have been notified almost every year, ten administrative areas being now involved, mostly near the coast. The legislative measures in force against the disease since 1928 (the period up to which year was covered by the writer's previous survey [*R.A.M.*, ix, p. 52]) are recapitulated [ibid., xiv, p. 64], and an alphabetical list, accompanied by explanatory notes as to their origin and reaction to infection, is given of the varieties included in the immunity trials (greenhouse and field) from 1919 to 1939.

Reid (W. J.), Wright (R. C.), & Peacock (W. M.). **Prevention of damage by the seed-corn maggot to Potato seed pieces.**—*Tech. Bull. U.S. Dep. Agric.* 719, 37 pp., 4 figs., 1940.

The following references to the mycological aspect of the control of the seed-corn maggot (*Hylemyia* [*Phorbia*] *cilicrura*) on potato seed pieces occur in this paper, the investigations reported in which cover the period from 1925 to 1933. In addition to *Bacillus phytophthorus* [*Erwinia phytophthora*: *R.A.M.*, xix, pp. 113, 360], the following organisms have been found in association with the insect at various times: *Fusarium oxysporum* by F. Weiss from North Carolina material in 1924 (*in litt.*); *Actinomyces scabies*, *Rhizopus nigricans*, and *F. martii minus* [*F. solani* var. *martii* f. 1] by the same worker from South Carolina samples in 1926; and species of *F.*, *Penicillium*, *Mucor*, and *Alternaria* by Lillian C. Cash from North Carolina seed pieces in 1932 (*in litt.*). In comparative experiments with suberized and freshly cut seed pieces, infection by *F. coeruleum* was responsible for losses of stand and probably also for reduction of yield in the former lots.

Bonde (R.). **The role of insects in the dissemination of Potato blackleg and seed-piece decay.**—*J. agric. Res.*, lix, 12, pp. 889–917, 9 figs., 1939. [Received April, 1940.]

Studies [which are fully described] carried out in Maine to determine the part played by insects in the spread of potato blackleg and seed-piece decay (*Erwinia carotovora*) [see preceding abstract] showed that planted seed pieces may be attacked by the seed-corn maggot *Hylemyia* [*Phorbia*] *cilicrura* and the seed-potato maggot (*H.* [*P.*] *trichodactyla*). Soft rot and other pathogenic bacteria are intimately associated with the different stages in the development of *P. cilicrura* in Maine and South Carolina, and were isolated from the surface of the

eggs, and from within the puparia and the adult. Bacteria capable of causing blackleg and decay were isolated from puparia of *P. cilicrura* overwintered in potato fields. Blackleg and seed-piece decay were produced under laboratory conditions by inoculations with both insects in Maine, while in South Carolina under similar conditions *P. cilicrura* successfully inoculated potato seed pieces and slices with *E. carotovora* and other pathogenic bacteria, though adults of this insect failed to inoculate potato seed pieces by mere contact under field conditions in South Carolina. The insects were not observed in potato bins.

The evidence showed that *P. cilicrura* and *P. trichodactyla* do not attack seed pieces unaffected by decay, but are attracted to bacterial lesions or injuries due to fertilizer burns or desiccation; they were not attracted to lesions due to fungi and free from bacteria. In South Carolina the young infected larvae of *P. cilicrura* enter shallow surface lesions on unsuberized seed pieces planted in moist, warm soil, and increase the decay by burrowing, complete destruction resulting if the soil moisture content is high. In southern areas injury caused by the insects can be obviated by suberizing the cut seed. In Aroostook County, Maine, seed pieces do not usually develop surface lesions from soil contamination, attack by both insects taking place through lesions on potatoes still in the bin before planting. Freshly cut potato seed may be planted in Aroostook County with no danger of injury by the insects.

Haasis (F. W.). **The distribution of Phytomonas sepedonica in Potato seed-pieces, plants and tubers, and its significance.** *Mon. Bull. Calif. Dep. Agric.* xxix, 1, pp. 16–20, 4 diags., 1940.

Reed's rapid Gram stain method was applied to an analysis of the distribution of *Phytomonas sepedonica* [*Bacterium sepedonicum*] in various organs of the potato plant [*R.A.M.*, xviii, p. 201; xix, p. 361] in Kern County, California. The bacterial population was found to vary greatly in density in the different parts of a plant and in a single tuber, with a general tendency towards a gradient from a heavier incidence near the seed piece to a lighter one in the upper portion of the plant and from larger numbers near the stem end of the tuber to smaller ones approaching the crown end. This mode of distribution would appear to be a corollary of the general restriction of the bacteria to the vascular region of living plant parts.

The wilting of plants in the field at an advanced stage of maturity is evidently caused by the occlusion of the water-conducting vessels by the bacterial masses, the accumulation of which in sufficiently large numbers to produce the effect in question occupies a considerable period. The divergences between individual tubers in respect of bacterial numbers are presumably correlated with similar differences in the seed pieces and resulting vines.

Dykstra (T. P.), Goss (R. W.), & Leach (J. G.). **The distribution of ring rot of Potatoes (Phytomonas sepedonica) in the United States.**—*Plant Dis. Reptr*, xxiv, 1, pp. 2–6, 1 map, 1940. [Mimeographed.]

A survey made to ascertain the distribution of potato ring rot (*Phytomonas sepedonica*) [*Bacterium sepedonicum*: see preceding

abstract] in the United States showed that the disease is known to be present in 27 States, and constitutes a real menace. Letters received during the survey stated that in one field planted with certified seed 20 per cent. loss was sustained, that in some fields infection reached 100 per cent., that in one county potato acreage and production had been halved owing to the disease in three years, and that in one State the estimated loss from the disease in 1939 was probably $250,000. Opinion was almost unanimous that infection was introduced into the different states on imported seed stock. It is probable that the disease has been introduced into the United States comparatively recently; if so, it will become more widespread unless some effective method of checking it is applied at once. Every safeguard should be adopted against introducing the disease into new localities on seed stock transported from one State into another for experimental purposes.

The most suitable common name for the disease is considered to be 'ring rot' or 'bacterial ring rot', a direct translation of 'Bakterienringfäule'.

Discussing the problems requiring attention, the authors consider that a promising means of control would appear to lie in the disinfection of the seed pieces after instead of before cutting. There is no experimental evidence to support the general assumption that the pathogen does not survive in the soil [ibid., xix, p. 236]. With the increased efficiency of virus disease control through certification, the use of whole, small tubers for seed purposes may possibly be found desirable. All the evidence shows that *Bact. sepedonicum* is very highly infectious; for this reason, the disinfection of containers, storehouses, and machinery is important. As infected plants or tubers may show very little injury, and such tubers may produce badly diseased plants, a more accurate method for determining infection must be found if seed certification is to be effective. A campaign to instruct growers in the dangers of the disease and the possibilities of control is also necessary.

Kawai (I.). **On the inclusion bodies associated with the stripe disease of Rice plants.**—*Ann. phytopath. Soc. Japan*, ix, 2, pp. 97–100, 5 figs., 1939. [Japanese. Abs. in *Biol. Abstr.*, xiv, 3, p. 526, 1940.]

The writer has recently detected in the mesophyll, and sometimes in the motor cells, of rice plants affected by stripe disease [*R.A.M.*, xvii, p. 768] inclusion bodies, 1·5 to 4·5 by 1·5 to 3 μ, situated near the larger nuclei and distinguishable from chloroplasts by a pale coloration on staining. These elements are a little smaller than those associated with dwarf, the only other virus disease of rice known in Japan [ibid., xviii, p. 613].

Yoshii (H.). **Some of the physical and chemical differences found in the inner and outer halves of a leaf blade of Rice in relation to Rice blast.**—*Ann. phytopath. Soc. Japan*, ix, 2, pp. 93–96, 1 fig., 1939. [Japanese. Abs. in *Biol. Abstr.*, xiv, 3, pp. 527–528, 1940.]

The lesions induced on rice foliage by the blast fungus (*Piricularia oryzae*) [*R.A.M.*, xix, p. 362] tend to be more numerous on the inner (broad) than on the outer (narrow) half of the leaf blade, resistance to needle puncture of the epidermal cell walls (as proved by the Jolly

balance) and silica accumulation in the cell walls (as shown by the Spodogram method), both of which factors are concerned in the capacity to withstand infection, being greater in the latter than in the former.

Burges (A.). **Soil fungi and root infection—a review.**—*Broteria*, viii, 2, pp. 64–81, 1 graph, 1939.

This is a concise survey of the information available to date on the relation of soil fungi to root infection [cf. *R.A.M.*, xvii, p. 625], most of the papers to which reference is made having been noticed from time to time in this *Review*.

Sabet (Y. S.). **On some fungi isolated from soil in Egypt.**—*Bull. Fac. Sci. Egypt. Univ.* 19, pp. 61–112, 45 figs., 1939.

Descriptions are given of the cultural and diagnostic characters of 86 Egyptian soil fungi, nearly all of which were mentioned by name in the author's preliminary paper [*R.A.M.*, xv, p. 314], where only three new species described therein, however, were figured.

Leeper (G. W.) & Swaby (R. J.). **The oxidation of manganous compounds by micro-organisms in the soil.**—*Soil Sci.*, xlix, 3, pp. 163–168, 1 pl., 1940.

Using the technique devised by Gerretsen [*R.A.M.*, xvi, p. 596] with some minor modifications, the writers investigated the role of micro-organisms in the oxidation of manganous compounds in samples of eight types of Australian soil, six of which are associated with manganese deficiency disease (grey speck) of oats.

The results of the experiments lent some support to Gerretsen's claim that the maximum incidence of the disease in soils with a P_H range of 6·5 to 7·5 is connected with the facility of microbial oxidation of bivalent manganese within these limits, though his upper one is considered to be too low in view of the fact that the most strongly 'deficient' type in the country (the calcareous soil of Corny Point, South Australia) has a hydrogen-ion concentration of P_H 8. Bacterial oxidation, however, is only one aspect of the manganese deficiency problem, some of the densest and most rapidly formed rings of manganic oxide developing on soil-agar plaques from non-'deficient' samples. In connexion with the absence of microbial formation of manganic oxide on very alkaline plaques, it is mentioned that manganese deficiency disease rarely occurs in soils with a P_H value above 8: the senior author (in unpublished investigations) has found that the growth of oats on 'deficient' soil may be greatly improved by raising the P_H above 8·5 with caustic soda.

Chang (S. C.). **Assimilation of phosphorus by a mixed soil population and by pure cultures of soil fungi.**—*Soil Sci.*, xlix, 3, pp. 197–210, 1 graph, 1940.

In cultural studies at the New Jersey Agricultural Experiment Station on the assimilation of phosphorus by soil micro-organisms (mixed and separately), a species of *Trichoderma* throve in the presence of high concentrations of phosphate, whereas a grey *Penicillium* was active at medium to low ones. Using glucose as a source of energy, the

fungi were found to synthesize considerably more organic phosphorus per unit weight of mycelium in a 1·5 than in a 0·5 per cent. solution, the nitrogen contents of the mycelium ranging from 5 to 7 per cent. *P.* sp. synthesized up to 6 per cent. organic phosphorus in a 1·5 per cent. phosphate solution, giving a 1 : 1 ratio of organic nitrogen to organic phosphorus, the corresponding amounts for *Rhizopus nigricans*, *T.* sp., and *Aspergillus* sp. ranging from 3 to 4 per cent. Mineralization of organic phosphorus, presumably accompanying autolysis, took place in all the cultures except those of *R. nigricans* at both phosphate concentrations, and was most pronounced for the three cellulose-destroying fungi (*T.* sp., *A.* sp., and *P.* sp.) after 21 days. These organisms, unlike *A. niger* and *R. nigricans*, were not adversely affected by the presence in the medium of large amounts of phosphate.

Katznelson (S.). **Survival of micro-organisms inoculated into sterilized soil.**—*Soil Sci.*, xlix, 3, pp. 211–217, 1940.

Some typical soil fungi and other micro-organisms were inoculated singly and in combination into steam-sterilized Palouse silt loam soil at the New Jersey Agricultural Experiment Station. Three plant-pathogenic fungi, *Rhizoctonia* [*Corticium*] *solani*, *Helminthosporium sativum*, and *Fusarium culmorum*, were able to develop in the sterilized soil: the two former were adversely affected by combination with two bacteria (*Bacillus cereus* and *Pseudomonas fluorescens*) or two Actinomycetes (*Actinomyces cellulosae* and *A. fradii*), whereas *F. culmorum* sustained no appreciable injury from similar associations. It is suggested that the application of mutual antagonisms of this type to the biological control of soil-borne plant pathogens may be a fruitful line of approach to the problem.

Heim (R.). **Un Agaric rhizomorphique parasite des semis de Quinquina en Haute-Guinée.** [A rhizomorphic Agaric parasitic on *Cinchona* seedlings in Upper Guinea.]—*Rev. Bot. appl.*, xx, 222, pp. 77–87, 2 figs., 1940.

In April, 1939, the author examined a number of seedlings of *Cinchona succirubra* and *C. ledgeriana* growing in frames at Macente, Upper Guinea, and affected by a form of 'damping-off' which attacked them when the two first leaves were 4 to 5 mm. long. The condition was due to a very small Agaric emitting numerous whitish rhizomorphs which spread through the beds, the mycelium penetrating the deeper tissues of the host.

The stipes were dirty white, not over 22 mm. high, and tapered from a diameter of not more than 3 (occasionally 4) mm. at the base to one of 0·7 mm. at the apex. They generally terminated in a minute, markedly involuted, dark bluish-grey pileus, less than 3 (in exceptional cases up to 4) mm. in diameter; beneath this the sterile hymenium was composed of approximately 24 pliciform, thick, widely spaced, markedly decurrent, whitish lamellae. The whitish, odourless flesh was continuous and non-separable from stipe to pileus. From the base of these structures, which were generally isolated but occasionally united in twos or threes, milky-white, branched rhizomorphs up to 250 μ in diameter spread through the soil, forming a network.

The young hymenium showed piriform-elongated basidial cells 6 μ wide, with no sterigmata and no sign of sporulation.

While the author was unable to identify the species as the basidia studied were too immature, he considers that it may be a *Clitocybe*, and briefly discusses other rhizomorphic Agarics and Basidiomycetes parasitizing plants.

The following control measures are recommended; removal and destruction of the fungi and the rhizomorphs as they appear; aeration of the plants in the shade for one or two hours on sunny days, and exposure to the sun for a suitable period; and partial soil sterilization before planting, with chemicals, natural heat, or steam.

MARTIN (J. P.). **Pathology.**—*Rep. Hawaii. Sug. Exp. Sta., 1939* (ex *Proc. Hawaii. Sug. Pl. Ass., 1939*), pp. 28–42, 1940.

In this report [cf. *R.A.M.*, xviii, p. 477] it is stated that the most important sugar-cane diseases in Hawaii at present are leaf scald (*Bacterium albilineans*) and chlorotic streak, with an occasional outbreak of eye spot (*Helminthosporium sacchari*). On the island of Maui eye spot is the principal disease, while leaf scald and chlorotic streak are only of localized importance. The most serious diseases in Kauai and Oahu are eye spot and brown stripe (*Cochliobolus stenospilus*) [the ascigerous stage of *H. stenospilum*], though in the last few months chlorotic streak has become somewhat more serious than before on some varieties in parts of Kauai. Mosaic is becoming of minor importance, as a result of the planting of resistant varieties, selection of healthy planting material, and improved weed control.

In a varietal resistance test, in which healthy and diseased cuttings of 23 varieties were planted, several varieties, including 31–2484 and 31–2510, showed marked tolerance towards chlorotic streak, while others, including P.O.J. 2878, D. 1135, Olaa 3055 and 32–1063 showed little tolerance, as indicated by the depressed growth in the plots planted with diseased cuttings.

Transmission of chlorotic streak occurs by means of cuttings and may be eliminated by hot-water treatment before planting, which also stimulates germination and early growth in cold, wet conditions. In almost every instance, treatment at 52° C. for 20 minutes has given 100 per cent. healthy stands. [In *R.A.M.*, xvi, p. 561, the record of the symptoms of chlorotic streak on elephant grass (*Pennisetum purpureum*) was given in error as on *Typha elephantina*.]

Leaf scald varietal resistance tests clearly demonstrated that most of the local varieties are commercially resistant and that very susceptible varieties can easily be detected by the external and internal symptoms which they develop. The disease was less severe than in previous years, and the use of resistant varieties is again suggested.

Red stripe [*Bact. rubrilineans*] is limited almost exclusively to the Kohala area, and, with the decline of the Tip canes here, is becoming much less serious.

PARRIS (G. K.). **A check list of fungi, bacteria, nematodes, and viruses occurring in Hawaii, and their hosts.**—*Plant Dis. Reptr, Suppl.* 121, 91 pp., 1940. [Mimeographed.]

Since the publication of F. L. Stevens's monograph on Hawaiian

fungi in 1925 [*R.A.M.*, v, p. 251], data relative to plant pathogens in the islands have accumulated and are here presented in two parts, viz., (1) an alphabetical list of plant hosts (under their scientific names) with the organisms reported on each, and (2) the organisms segregated into their respective systematic groups—fungi, bacteria, nematodes, and viruses—with the hosts on which they occur. The bibliography comprises 71 titles.

Wehmeyer (L. E.). **Contributions to a study of the fungus flora of Nova Scotia. IV. Additional Basidiomycetes.**—*Canad. J. Res.*, Sect. C., xviii, 3, pp. 92–110, 1 pl., 1 fig., 1940.

This list of 134 Basidiomycetes collected in 1931 and 1933 in Nova Scotia (chiefly in Colchester County) is noteworthy for the large number of Polypores. *Stereum purpureum* [*R.A.M.*, xix, p. 239] is reported on *Salix* and *Stereum sanguinolentum* was commonly found on dead standing *Abies balsamea* [ibid., xvi, p. 77].

Naito (N.). **Studies on septorioses of plants. VII. New or noteworthy species of Septoria found in Japan.**—*Mem. Coll. Agric. Kyoto*, 47, pp. 31–43, 1 pl., 1940.

This is a critically annotated list of 22 species of *Septoria*, including 12 new ones, collected since the spring of 1935 on flowering plants in the vicinity of Kyoto, Japan.

Naito (N.). **Notes on some new or noteworthy fungi of Japan.**—*Mem. Coll. Agric. Kyoto*, 47, pp. 45–52, 4 figs., 1940.

This is a critically annotated list of 13 new or otherwise noteworthy leaf-spotting fungi collected since the spring of 1935 in Japan (mostly in the Kyoto Prefecture). *Heterosporium albizziae* (Petch) Naito n. comb. (*Helminthosporium albizziae*), found for the first time in Japan, producing circular, pale yellow or blackish spots, 0·5 mm. in diameter, on the foliage of *Albizzia julibrissin*, is characterized by fasciculate, fuliginous conidiophores, 33 to 60·8 by 8·7 to 10·4 μ, and straight or slightly curved, bi- to triseptate, minutely verrucose, fuliginous conidia, 27·8 to 52·1 by 8·7 to 10·4 μ.

Vladimirskaya (Mme M. E.). Паразит ржавчины сельскохозяйственных растений—**Tuberculina persicina (Ditm.) Sacc.** [A parasite of rusts of cultivated plants, *Tuberculina persicina* (Ditm.) Sacc.]—*Bull. Pl. Prot., Leningr., 1939*, 1, pp. 103–110, 1 graph, 1939. [Received April, 1940.]

Tuberculina persicina [*R.A.M.*, xviii, p. 528] was isolated in pure culture from uredo-pustules of *Puccinia suaveolens* from *Cirsium arvense*. Abundant spore germination occurred on slices of carrot, seeds of pea, soy-bean, maize, and rice, and on milk and beer wort agars at temperatures between 9° and 28° C. (most rapidly at 15° to 25°), the period required for sporulation varying, on favourable media, from 8 to 15 days. Media most favourable for the mass cultivation of the fungus are those containing a large proportion of sugars and little protein. Inoculations of the spermogonial and aecidial stages of *P. dispersa* on *Anchusa officinalis* and *P. graminis* on barberry with cultures

of *T. persicina* yielded positive results after an incubation period of 7 to 8 days, resulting in an inhibition of further development of the rusts; negative results were obtained with inoculations of uredosori.

Remsberg (Ruth E.). **Studies in the genus Typhula.**—*Mycologia*, xxxii, 1, pp. 52–96, 58 figs., 1940.

As a result of cultural studies on various species of *Typhula*, it is suggested that this genus be used to include species with small, filiform, clavate sporophores which normally arise from sclerotia, and the separation of species within the genus chiefly based on sclerotial morphology. A revised description of the genus is given and *T. phacorrhiza* chosen as the new type species, being the most frequently collected and more completely described and illustrated than any other of the genus.

The author recognizes 14 species of *Typhula*, of which nine are new, and supplies a key and an annotated list of the species with Latin diagnoses for the new ones. She accepts *T. itoana* [*R.A.M.*, xix, p. 351] and states that comparative cultural studies of the organism received from Japan showed it to agree with that from the United States; the organism causing the same type of disease of cereals and grasses in northern Europe, previously identified as *T. graminum* [loc. cit.] also proved to be identical with *T. itoana* and so did *Sclerotium fulvum* [loc. cit.] from the Roumeguère collection. An examination of sclerotia from the type material of *T. graminum*, however, showed their morphology to be entirely different from that of *S. fulvum* and *T. itoana*, the medulla being prosoplectenchymatous with a layer of enlarged thin-walled cells adjacent to the homogeneous, gelatinous rind; furthermore, the sporophores are white instead of coloured. It would appear, therefore, that *T. itoana* is distinct from *T. graminum*.

The new species *T. umbrina*, found on turnips in cold storage and on leaves and rhizomes of *Iris*, is described as having brown, later black, sclerotia, 0·5 to 4·0 mm., with a reddish-brown cortex 7 to 12 μ thick; clavate, erect, simple, straight or slightly curved sporophores, 8 to 15 mm. high; elongated, four-spored basidia, 31 to 39 by 5·8 to 7·8 μ; and ovate basidiospores, 11·7 to 15·6 by 3·9 to 7·8 μ or on the average 12·5 by 5·5 μ. The fungus causes a mild necrosis and is possibly weakly pathogenic.

T. variabilis [ibid., xii, p. 416] (among the synonyms of which *S. semen* [ibid., viii, p. 597] and its var. *brassicae* are of interest) is reported as causing a very destructive disease of sugar beets and potatoes in Europe and the Azores, and also being weakly pathogenic on stored celery. Artificial infection was successful on the above-mentioned hosts and asparagus rhizomes. In culture the fungus grows over a range of 0° to 21° C. with an optimum at 12° to 15°; mycelial growth is appressed, woolly to powdery, and inconspicuous; sclerotia are produced in 7 to 14 days and are single or coalesced into masses, white when young, later mahogany-red to chestnut brown. The new species *T. idahoensis* [ibid., xix, p. 351] is stated to cause a disease of cereals and grasses similar to that caused by *T. itoana* and is often collected in the same field, but is readily distinguished by its sclerotial colour, which is light amber at first and chestnut-brown at maturity.

The organism grows in culture over a range of 0° to 18° with an optimum at 9° to 12°; mycelial growth is abundant, fluffy, and concentrically banded; the sclerotia, which appear after 5 to 10 days, are clustered or in concentric rings, and always single; and the sterile brown sporophores develop from sclerotia abundantly.

HOERNER (G. R.). **A nomenclatorial note on Pseudoperonospora.**— *J. Wash. Acad. Sci.*, xxx, 3, pp. 133–134, 1940.

On the basis of priority, and following the present generally accepted rules of nomenclature, Rostoffzeff's generic name *Pseudoperonospora* (*Flora, Jena*, xcii, pp. 405–430, 1903) antedates Clinton's elevation (*Rep. Conn. agric. Exp. Sta., 1904*, pp. 329–362, 1905) of Berlese's subgenus *Peronoplasmopara* (*Riv. Pat. veg.*, ix, pp. 123–126, 1901) to generic rank, and the author therefore upholds the validity of *Pseudoperonospora* and transfers to it three species, the systematic position of which is obviously proclaimed by their characteristics, including *Peronospora cannabina* as *Pseudoperonospora cannabina* (Otth) n. comb.

DRECHSLER (C.). **Three species of Pythium associated with root rots.**— *Phytopathology*, xxx, 3, pp. 189–213, 8 figs., 1940.

Pythium dissotocum, originally described by the author from sugar-cane roots in Louisiana [*R.A.M.*, x, p. 211], but also isolated on various occasions from peas [ibid., iv, p. 456; v, p. 69], *Pilea pumila*, beet, and spinach, produces in pure culture, e.g., on Lima bean agar, an abundance of zoosporangia, many of which consist of undifferentiated filaments, while others include a number of distended lateral branches. These organs give rise to immense numbers of zoospores, of which 50 to 125 may be formed in each vesicle, with a marked proclivity to itinerant swarming. The antheridial relationships of the species are comparable to those typified by *P. de Baryanum* and *P. ultimum*. The oogonial and oospore diameters of *P. dissotocum* on maize meal agar range from 12 to 32 (mostly 21) μ and 11 to 27 (17) μ, respectively.

The zoosporangia of *P. periilum*, also from sugar-cane in Louisiana, are richer in swollen elements than those of *P. dissotocum*. Its oogonium is copiously and closely inwrapped by a branching antheridial filament in much the same way as in *P. scleroteichum*, the agent of a labyrinthine root rot of sweet potato [ibid., xiv, p. 467], and in various terrestrial species of *Aphanomyces*. The oogonial and oospore diameters of *P. periilum* range from 16 to 22 (mostly 19) μ and 14 to 20 (17) μ, respectively.

P. paroecandrum, isolated from field garlic (*Allium vineale*) and *Sanguinaria canadensis* in Virginia and from *Impatiens pallida* in the District of Columbia, produces subspherical zoosporangia resembling those of *P. de Baryanum*. As implied in the Greek specific name, the antheridia often arise in close contiguity to the oogonium, in which respect *P. paroecandrum* shows a strong affinity with *P. ultimum*, though the internal organization of the oospore, with its fairly large reserve globule, is more in conformity with that of *P. de Baryanum*. The oogonial and oospore diameters of *P. paroecandrum* are 11 to 27 (mostly 21) μ and 10 to 22 (18) μ, respectively.

Baldacci (E.). **Revisione delle specie : Actinomyces albus, A. chromogenus, A. odorifer, A. thermophylus, A. viridis, A. viridochromogenes, A. hominis, A. innominatus.** [A revision of the species *Actinomyces albus*, *A. chromogenus*, *A. odorifer*, *A. thermophylus*, *A. viridis*, *A. viridochromogenes*, *A. hominis*, *A. innominatus*.]—*Mycopathologia*, ii, 3, pp. 145–161, 2 pl., 1940. [English summary.]

Continuing his studies on the systematic position of Actinomycetes [*R.A.M.*, xix, p. 45], the author re-describes *A. albus* (of which 30 synonyms are listed, including *A. chromogenus*, and five varieties are recognized), *A. viridis* Pelleg. (with five synonyms including *A. viridis* Millard & Burr), and *A. innominatus* (a new name for *A. hominis* Bostroem, *A. hominis* Auct. being regarded as a *nomen ambiguum*). *A. chromogenus*, *A. odorifer*, and *A. thermophylus* have many biological characters in common with other species of the genus, which may be used for sub-specific differentiation only. *A. albidoflavus* and *A. aureus* were found to belong to the *flavus* group, which requires revision. Some strains classified as *A. farcinius* doubtless should be referred to *A. albus*, but the real specific entity remains to be revised from Nocard's strain.

Castellani (E.) & Ciccarone (A.). **Osservazioni su un micromicete del 'Ciat' ('Catha edulis' Forsk.)** [Observations on a fungus of 'Khat' (*Catha edulis* Forsk.).]—*Nuovo G. bot. ital.*, N.S., xlvi, 4, pp. 611–614, 1 fig., 1939. [Issued February, 1940.]

Examination of numerous specimens of *Catha edulis* [the leaves of which are used for making African tea] from Harar, Abyssinia, infected by a fungus referred by Elisei to *Cycloschizon pollaccii* Elisei showed the presence on the leaves and branches of sparsely arranged or loosely aggregated, round or subelliptical, slightly raised, easily detachable, black crusts, 0·6 to 1 mm. in diameter, on a central, deep olivaceous, subepidermal foot, 80 to 110 μ wide and 45 to 60 μ long. The hypothecium was lighter in colour, and the clavate, hyaline or slightly fuliginous asci, separated by a fibrous, paraphysoid tissue of smoky colour, were arranged in one ring-shaped locule surrounded by the central depression of the ascostroma. The ovoid-elongated, hyaline, later dark olivaceous ascospores measured 26 to 30 by 10 to 12 μ, and were regularly uniseptate, constricted at the septum, and showed an upper cell slightly wider than the lower.

In view of the fact that all those workers who have examined the type species of *Cycloschizon* (*C. brachylenae* (Rehm) P. Henn.) state that the spores of this genus are hyaline, and as von Höhnel maintains that *Cycloschizon* and *Dielsiella* are both valid genera, the former having hyaline and the latter dark spores, the authors rename the fungus *Dielsiella pollaccii* (Elisei) Cicc. & E. Cast. n. comb.

Berkeley (G. H.) & Koch (L. W.). **Diseases of Tobacco in Canada.**—*Fmrs' Bull. Canad. Dep. Agric.* 85, 29 pp., 19 figs., 1940.

Popular notes, incorporating the latest available information, are given on a number of fungal, bacterial, virus, and physiological diseases of tobacco in Canada and their control [*R.A.M.*, xvii, p. 560].

Woods (M. W.). **Reversible inhibition of Tobacco mosaic virus in living cells with 0·002 molar sodium cyanide.**—*Science*, N.S., xci, 2360, pp. 295–296, 1940.

Detailed studies have shown that protoplasmic streaming in leaf cells of tobacco is oxygen-sensitive, and that the rate of streaming can be reversibly inhibited by sodium cyanide. The tobacco leaf can, however, be kept alive for several days by alternate immersion in a 0·0002 μ solution of sodium cyanide and dialysing with water. When tobacco leaves were inoculated with a single-lesion strain of severe mottling tobacco mosaic virus and one half treated with a 0·0002 M sodium cyanide solution, it was shown that multiplication of tobacco mosaic protein was strongly inhibited (up to 73·2 per cent. reduction in virus concentration). Since in all experiments protoplasmic streaming was still active in the leaf cells at the end of the test, reduction of virus multiplication cannot be attributed to death of cells during treatment. Measurements of virus concentration made 25 hours after cessation of cyanide treatment showed that virus multiplication had been resumed. Detached leaves of an F_2 necrotizing hybrid (*Nicotiana tabacum* × *N. glutinosa*), which usually develop necrotic spots 60 to 75 hours after inoculation when held in air or immersed in oxygenated water, showed none after 70½ hours when treated with 0·0002 M sodium cyanide for a total of 53 hours, the lesions appearing only after the treatment had been stopped for 50 hours. The tobacco mosaic virus responds to 0·0002 M sodium cyanide in much the same way as certain haemin-containing catalysts, indicating that the virus mechanism either depends on the activity of haemin-containing respiratory catalysts of the cell or the virus protein itself may contain haemin or some similar structural unit that can be blocked reversibly with cyanide.

Pfankuch (E.), Kausche (G. A.), & Stubbe (H.). **Über die Entstehung, die biologische und physikalisch-chemische Charakterisierung von Röntgen- und γ-Strahlen induzierten 'Mutationen' des Tabakmosaikvirus.** [On the origin and the biological and physico-chemical characterization of the 'mutations' of the Tobacco mosaic virus induced by Röntgen and γ-rays.]—*Biochem. Z.*, ccciv, 4, pp. 238–258, 6 figs., 1940.

A convenient stage has now been reached in the writers' studies at the Biological Institute, Dahlem, Berlin, on the tobacco mosaic 'mutations' experimentally induced by exposure to X- and γ-rays [*R.A.M.*, xix, p. 358] to sum up the results obtained to date.

The aberrant forms of the virus arising through the irradiation of a mesothorium preparation with 12,000 to 14,000 Röntgen units or γ-rays are not to be interpreted as portions of the normal tobacco mosaic virus molecule. Their basic molecular weight approximates to that of the normal virus, but certain forms show a stronger tendency to polymerization, while the solubility and hydratation relationships of the 'mutants' can be differentiated from those of the normal by a simple nephelometric method. Evidence is adduced for the development of the new forms in the nucleic acid portion of the virus molecule, where they are conditioned by quantitative and qualitative changes.

Biological analysis showed that the symptoms produced by the 'mutants' on Samson tobacco leaves are quite distinct from those due to the normal mosaic virus. TM 44, for instance, gave rise in the first place to diffuse but circumscribed yellow spots, followed on the next developing leaves by a secondary pattern consisting in a complete bleaching of the leaf veins and the portions of the blade adjoining them on either side, while the intercostal areas remained green. The tertiary symptom was a sharply defined, coarse or fine mosaic ranging in colour from pure white through yellowish-green to very dark green. The incubation periods of the variants were almost always longer, sometimes considerably, than those of the normal virus. Qualitatively the activity of TM 44 and 46, as well as that of TM 88 (radium), was substantially increased, while TM 50 and 58 were much reduced in this respect. Quantitatively the titres mostly lay below those of the normal virus.

Both in their structure and activities the phytopathogenic viruses are considered to present certain analogies with genes [loc. cit.], and the nature of the physico-chemical changes in the material under observation points to definite mutational processes in the genetic sense, i.e., alterations in the intramolecular condition.

Bortner (C. E.) & Karraker (P. E.). **Studies of frenching of Tobacco, with particular reference to thallium toxicity.**—*J. Amer. Soc. Agron.*, xxxii, 3, pp. 195–203, 2 figs., 1940.

In experiments at the Kentucky Agricultural Experiment Station the addition of thallium to Turkish tobacco plants in water, sand, and soil cultures uniformly caused chlorosis, which assumed several forms, none of them entirely resembling frenching as it occurs in the field [*R.A.M.*, xviii, p. 716]. Thus, thallium-induced chlorosis appears in the tissues of the leaf base and along the larger veins, whereas the field symptoms originate in the interveinal tissue of the apical margin. Moreover, thallium-induced chlorosis may first develop in the larger leaves, while the onset of frenching is confined to the top foliage of the main plant or the suckers.

The amounts of the mineral required to cause chlorosis varied in the different forms of culture, 0·04 p.p.m., for instance, sufficing in water, while larger quantities were generally necessary in sand, and much heavier applications (up to 38 p.p.m.) were needed in soil; in one series a total of 28 p.p.m. failed to induce the condition. These figures represent an excess of thallium unlikely to be found in nature.

Thallium treatments neither accelerated frenching in soils in which the disease occurs spontaneously nor produced it under conditions where it is normally absent. Liming and a low nutrient content, which tend to produce frenching, did not increase thallium chlorosis.

Wolf (F. A.), McLean (Ruth), Pinckard (J. A.), Darkis (F. R.), & Gross (P. M.). **Volatile fungicides, benzol and related compounds, and the principles involved in their use.**—*Phytopathology*, xxx, 3, pp. 213–227, 2 figs., 3 graphs, 1940.

Experiments in North Carolina and Virginia have shown that in certain seasons, such as the relatively warm and dry one of 1939, it is

not necessary to apply benzol every night to tobacco seed-beds in order to secure complete protection against downy mildew (*Peronospora tabacina*) [*R.A.M.*, xix, p. 306]. The length to which the interval between successive treatments can be protracted probably depends on the length of the sporangial cycle as modified by the prevailing weather conditions. 'Cotton balls', consisting of 30 gm. compacted non-absorbent cotton covered with cloth, dipped in benzol, constitute an effective means for the vaporization of the compound in seed-beds, one ball sufficing for each 4 sq. yd.

An increase in the permeability of the plasma membranes of tobacco seedlings was observed to result from exposure to benzol and paradichlorbenzene vapours. Concentrations of benzol ($\frac{1}{16}$ saturation), paradichlorbenzene ($\frac{1}{2}$), phenol ($\frac{1}{750}$), and aniline ($\frac{1}{75}$) closely approximate to the minimum toxic limits for the inhibition of sporangial germination in *P. tabacina*.

Discussing the principles governing the efficacy of fumigant fungicides, the writers have found that their action on and in the plant tissues takes place through the medium of their aqueous solutions, the concentrations effective against the pathogen being lower than those toxic to the host. Solubility in water is thus of primary importance in the utility of fungicides of this type for the end in view.

Wolf (F. A.) & McLean (Ruth A.). **Sporangial proliferation in Peronospora tabacina.**—*Phytopathology*, xxx, 3, pp. 264–268, 1 fig., 1940.

In order to obtain adequate supplies of sporangia for their studies on *Peronospora tabacina* [see preceding abstract], the writers inoculated seedlings in glass jars, containing about 500 gm. steam-sterilized soil, with aqueous sporangial suspensions and then closed the jars with screw-cap tops. The vessels were then placed in an incubation chamber at 15° C. and subjected to continuous irradiation by a 25-watt bulb, under which abnormal conditions proliferated sporangia were produced, a phenomenon believed to be hitherto unknown among the Peronosporaceae. Several types of proliferation were observed. In some instances the inner sporangial wall protruded apically and became enlarged; in others a tube was formed that remained unbranched or branched dichotomously, producing from one to four small, secondary terminal sporangia, which may also proliferate in their turn. In other cases, again, the primary sporangium gave rise to a dichotomously branched sporangiophore bearing eight minute, immature, secondary sporangia, this last-named type of proliferation apparently having no counterpart among the related families of Phycomycetes, in which the process as a whole, however, is not uncommon. In *P. tabacina* proliferation is evidently related to the continuous humidity and weak illumination incidental to the experimental conditions, having never been observed in eight years' studies on the fungus on plants spontaneously infected out of doors.

Diachun (S.). **Relation of stomata to infection of Tobacco leaves by Bacterium tabacum.**—*Phytopathology*, xxx, 3, pp. 268–272, 2 figs., 1940.

Details are given of tests in the greenhouse and field at the Kentucky

Agricultural Experiment Station in 1939, the results of which showed that the stomatal condition of the leaves, examined by Lloyd's technique (*Publ. Carneg. Instn*, 82, 1908), is one of the determining factors in the extent of infection developing as a sequel to atomization with a suspension of *Bacterium tabacum* [*R.A.M.*, ii, p. 38]. During the day the stomata are usually open and inoculation produces heavy infection; at night or in artificial obscurity, on the other hand, they are mostly closed and only a few lesions are formed.

Virgin (W. J.). **The Chilean Tomato, Lycopersicon chilense, found resistant to curly top.**—*Phytopathology*, xxx, 3, p. 280, 1940.

In greenhouse and field tests in Idaho in 1939 *Lycopersicum chilense* remained completely free from curly top of beet [*R.A.M.*, xviii, pp. 64, 824] under conditions involving close contact with the insect vector of the disease (*Eutettix tenella*) and inducing severe infection in commercial varieties (Earliana in the greenhouse).

Moore (W. D.). **Results of Tomato seedling disease investigations in Georgia, 1937–1938.**—*Canning Age*, xxi, 3, p. 124, 1940.

Spore trap studies on tomato collar rot and stem canker (*Alternaria solani*) [*R.A.M.*, xviii, p. 421] showed the pathogen to be widely distributed throughout the tomato-growing regions of Georgia, where the process of spore dissemination continues almost uninterruptedly throughout the year. General infection is favoured by high humidity and warmth. Bordeaux sprays have been found to cause injury to the seedlings during dry spells, and may be replaced during the current year by copper compound A or tribasic copper. The development of the disease appears to stand in direct relation to the age of the plants, so that local sowings should be made at intervals to meet the [seedling] requirements of northern markets. The incidence of canker on the seedlings is proportionate to the extent of wilting allowed between picking and packing in moss for shipment, indicating the importance of accelerating field operations so as to reduce wilting to a minimum. Experimental results and observations on local packing methods suggest the adoption of more stringent precautions in packing, using larger quantities of moss, possibly fewer plants per bundle, and taking greater care in the covering of the roots. The maintenance of a temperature range between 60° and 70° F. in the shipping crate has been found largely to prevent the development of infection in transit.

Thomas (H. R.). **Collar-rot infection on direct-seeded Tomatoes.**—*Plant Dis. Reptr*, xxiv, 1, pp. 8–10, 1940. [Mimeographed.]

In 1939 observations were made in a 60-acre field in Indiana on the incidence of collar rot [*Alternaria solani*: see preceding abstract] on tomato plants 'direct-seeded' on land, some of which was planted to tomatoes in 1938, when the plants were severely attacked by the leaf spots due to *A. solani* and *Septoria lycopersici*. The only parts not sown to tomatoes in 1938 were strips about 50 ft. wide along two sides of the field, which were planted to soy-beans. In July, 1939, the amount of collar rot found was 5·9 and 0·4 per cent., respectively, in the parts sown to tomatoes and soy-beans the year before. Two rows of home-

grown plants set through the middle of the field about the time when the 'direct-seeded' plants were thinned showed 0·2 per cent. collar rot.

The first sign of disease consisted in necrotic spotting of the new growth. When affected plants were pulled up, typical collar rot lesions were noted on the stem just below the soil surface. No pathogenic organism was recovered from the spots but a similar condition has been experimentally induced by inoculation with spores of *A. solani*. The evidence suggested that enough inoculum of *A. solani* collected on the tomato debris of the previous season to produce the collar rot outbreak of 1939. Spread of spores and dead leaves by the wind in 1938 did not (in 1939) seriously affect the adjacent portion of the field that had been planted to soy-beans.

It is also stated that in 1938, in another locality where tomatoes are grown on the same land every year, approximately 80 per cent. of the tomato plants in a 'direct-seeded' field became affected by collar rot.

Orth (H.). **Die Stengelfäule der Tomate.** [The stem rot of Tomato.]—*Kranke Pflanze*, xvi, 9–10, pp. 155–159, 1939.

In addition to information already presented from another source [*R.A.M.*, xviii, p. 636], the following facts concerning tomato stem rot (*Didymella lycopersici*) and its control in Germany are of interest. The disease is prevalent on heavy soils with a high humus content, such as the fertile plain of Magdeburg, where losses up to 70 per cent. of the crop have been observed. In this district infection may be largely reduced by a postponement of the normal sowing date to about the middle of March. In experiments in 1937 the incidence of stem rot on 2nd September in a stand sown on 20th April was 25 per cent. as against 58·8 per cent. in one sown on 25th February (the former date, however, would be too late for commercial practice).

An important factor in the successful control of the disease by watering with 0·1 per cent. mercuric chloride is the time of the first application, the most suitable conditions being provided in July by a drop in the temperature to 20° C. following heavy precipitation; another treatment should be given three to four weeks later. There can be no question as to the profitability of the treatment in cases where a severe attack appears imminent, the cost per plant (reckoning mercuric chloride at Rm. 10 per kg.) being only about Rm. 0·01. As regards indirect measures of combating the pathogen, the following experiment, carried out in a heavy black humus soil receiving liberal annual applications of stable manure (200 zentner per ¼ hect.) [nearly 16 tons per acre] and a complete mineral fertilizer, is of interest. By growing tomatoes as a 'second crop', i.e., in the year following manuring, the incidence of infection was reduced from 35 to 68 per cent. in 'normal' years to 0·7 per cent., whereas in the following year again, fresh applications of stable or peat manure caused a heavy increase of stem rot, which was practically absent from the synthetically fertilized and untreated plots.

True (R. P.) & Slowata (S. S.). **Attempts to isolate Ceratostomella ulmi from stored Elm wood.**—*Phytopathology*, xxx, 3, pp. 272–274, 1940.

In September, 1936, living American elm branches, 1 to 4 in. in

diameter, infected by *Ceratostomella ulmi* [*R.A.M.*, xviii, p. 717] were cut into 611 1-ft. lengths and divided into three lots for storage under different field conditions. Lot 1 was placed on the ground in deep forest shade, lot 2 was laid on the grass in an unshaded area, and lot 3 was put on a rack 18 in. above the ground, exposed to direct sunshine for the greater part of the day. All bark was removed from half the pieces in each lot, and the side of each stick, showing at the cut ends the most severe discoloration due to the disease, was marked for subsequent cutting. In January, 1937, an attempt was made to isolate the pathogen on potato sucrose agar or in moist chambers at 60° F. from one-third of the total number of sticks representing the various methods of storage. At this stage the maximum percentage of positive results (95) was obtained from the heavily shaded sticks with bark adhering, and stored with the discoloured side downward, and the minimum (17) from those on the unshaded grass area, decorticated, and with the discoloured side upward. After attempted isolation the sticks were restored to their original environment. In May, 1938, the same procedure was repeated. The maximum percentage of infection (23) was again found among the shaded sticks with bark adhering and discoloration downward, the only other positive results being given by shaded sticks with bark adhering and discoloration upward (8 per cent.), those stored in grass with bark adhering and discoloration downward (2), and those placed in the rack, discoloured side downwards, decorticated (4) and bark adhering (2).

Carter (J. C.). **Progress in the control of Elm diseases in nurseries.**—*Biol. Notes Ill. nat. Hist. Surv.*, *1939*, 10, pp. 1–19, 6 figs., 1939. [Abs. in *Biol. Abstr.*, xiv, 3, p. 528, 1940.]

Satisfactory control of elm leaf spots (*Phyllosticta* and *Mycosphaerella*) and anthracnose (*Gnomonia ulmea*) [*R.A.M.*, xviii, p. 146], accompanied by an increase in the commercial value of the trees, was obtained in Illinois in experiments over a period of several years involving more than 6,500 nursery trees by the following treatments: (1) summer dusting with kolodust; (2) summer dusting with flotation sulphur dust and mike sulphur [ibid., xviii, p. 598]; (3) dormant and summer spraying with instant Bordeaux [ibid., xiv, p. 349]; and (4) summer spraying with mike sulphur, pruning being a necessary adjunct to all the treatments except possibly No. 2. The sulphur dusts in general gave the most consistent results. Some of the treatments were also partially effective (30 per cent. or over) against the wilts caused by *Verticillium* [ibid., xviii, p. 281], *Coniothyrium* [ibid., xvii, p. 70 and loc. cit.], *Phoma* [ibid., xiv, p. 537], and *Cytosporina* [*ludibunda*: ibid., xvi, p. 71]. The first application of the fungicide should be made in late April or early May, followed by treatments at fortnightly intervals until the end of June (or mid-July under moist conditions), and thenceforward every three weeks until the end of August. Pruning should immediately precede each treatment.

Kelley (A. P.). **The Chestnut blight and its relation to the principle of disease resistance.**—*Science*, N.S., xci, 2360, pp. 290–291, 1940.

Continuing the studies on chestnut blight [*Endothia parasitica*:

R.A.M., xviii, pp. 354, 827], the first report of which was published in 1924 [ibid., iv, p. 200], the author presents the following data on the survival of the American chestnut. The ratio of new growth to the length of stem and twig killed by blight, measured on trees of the permanent experimental plots, was 3 to 1 in 1926 and better than 2 to 1 in 1939. Stump sprouts have very little resistance to blight, and their rapid destruction has led to the popular belief that the chestnut is being exterminated; seedlings, on the other hand, proved highly resistant, many of them on the experimental plots having come through the 15 years of observation untouched or only little affected by blight. In a number of seedlings under observation blight had evidently entered through gunshot wounds inflicted by hunters. Shading is very detrimental to both seedlings and stump sprouts and a careful release cutting is recommended, for wherever this has been done the chestnut shoots into rapid and healthy growth.

In an attempt to explain the nature of resistance to blight in chestnuts, the author examined microscopically diseased and healed cankers: the former were found to contain abundant mycelium penetrating freely through the tissues, whereas the latter showed limited fungus growth with all stages of breaking-down of the fungus with the formation of 'digestion cells' and enlarged host nuclei. These results are held to indicate a development comparable to mycorrhiza, and it is furthermore suggested that the relation of fungus to host is dependent on the balance of osmotic pressures: the fungus penetrates into the host tissues as long as it can maintain a higher osmotic pressure than the host sap it encounters, but whenever it meets a higher one it is broken down and absorbed by the host cell. The resistant canker of the chestnut is thus one possessing greater osmotic values than the fungus, and the resistant seedlings are those of healthy, vigorous growth with salt-rich sap. Stump sprouts are, on the other hand, killed by the fungus because their root systems are not able to retain their vigour after the large trees which formerly supported them have been removed.

Bongini (V[irginia]). **Note fitopatologiche.** [Phytopathological notes.] —*Boll. Lab. sper. R. Oss. Fitopat., Torino*, xvi, 1–4, pp. 54–64, 3 pl., 1939 (issued 1940).

The fatal wilt of young rooted cuttings of *Cryptomeria japonica* var. *elegans* and *C. viridis* observed in nurseries in Turin in the winter of 1935–6, and associated with *Cladosporium laricis* and a species of *Phomopsis* [*R.A.M.*, xvii, p. 362], has continued to cause losses in cuttings taken from apparently healthy mother plants promptly removed from the affected nurseries to a distance of several hundred metres. As the progress of the disease is very slow, vegetation remains normal during the initial stages of mycelial growth, and this accounts for the spread of infection by means of apparently healthy cuttings. Spraying failed to give satisfactory control, and the only cultural practice found to check the condition was to grow the mother plants in a mixed nursery between rows of broad-leaved species. Though infection experiments are not recorded the author suspects that *C. laricis* is the pathogenic agent rather than the *Phomopsis*.

During the spring of 1939, planes [*Platanus*] were severely attacked

by *Gnomonia veneta* [ibid., xii, p. 735; xviii, p. 827]. Cultural studies [which are described in detail] with conidia of the imperfect stage (*Gloeosporium nervisequum*) from the leaves, and spores of *Discula platani* [ibid., xviii, p. 213] and *Fusicoccum veronense* from the branches showed that all belonged to the first-named, with which *G. platani*, *G. valsoideum*, *Sporonema platani*, and *Cytosporella platani* are regarded as identical. The branch-inhabiting form of the disease is considered much the more dangerous. The most important control measure lies in the prompt removal of the first branches that become infected, especially in the nursery; if infection is more advanced, all the large branches should be cut off and burned, and the wounds disinfected.

Shear (C. L.) & Davidson (R. W.). **A new species of Dothiora on Aspen and Willow.**—*Mycologia*, xxxii, 1, pp. 105–111, 3 figs., 1940.

A description [with a Latin diagnosis] is given of a new species, *Dothiora polyspora*, found on branches of willows [*Salix*] and aspens in Colorado. The presence of the fungus on dead tips of living twigs of aspen and willow and on stem cankers of young aspen suggests weak parasitism, but no inoculation experiments were attempted. In monoascospore cultures on agar media the fungus resembled a species of *Dematium*, but inoculations of sterilized willow twigs yielded a pycnidial stage similar to *Dothichiza*.

Servazzi (O.). **Contributi alla patologia dei Pioppi. VII. Su alcuni micromiceti pioppicoli.** [Contributions to the pathology of Poplars. VII. On some Poplar-inhabiting micromycetes.]—*Boll. Lab. sper. R. Oss. Fitopat., Torino,* xvi, 1–4, pp. 86–96, 1 pl., 1939 (issued 1940).

Continuing his investigations into poplar diseases [*R.A.M.*, xviii, p. 639] the author gives an annotated list of 25 fungi, mostly common saprophytes, found on this host in Italy.

Hahn (G. G.). **Distribution and hosts of Cedar blight in the United States. Reports of Cedar blight in 1939.**—*Plant Dis. Reptr*, xxiv, 3, pp. 52–58, 1 map, 1940. [Mimeographed.]

Red cedar (*Juniperus virginiana*) blight (*Phomopsis juniperovora*) [*R.A.M.*, xix, p. 328] is now known to occur in 25 States of the American Union, as well as in the District of Columbia. New hosts of the fungus [ibid., x, p. 83] include *J. japonica*, *J. chinensis* var. *mas*, *J. horizontalis* var. *douglasii*, and *J. ashei*, while *J. virginiana* var. *pyramidiformis hillii* (the Dundee or Hill Dundee juniper) has given evidence of resistance in recent tests. During 1939 the blight was destructive in Minnesota and Wisconsin, but of recent years, according to a written communication from E. Wright, of the Nebraska Division of Forest Pathology, it has been of little importance in the western States, Nebraska, Kansas, Oklahoma, and Texas, the succession of dry seasons possibly contributing to the lack of serious infection in Nebraska and Kansas where the fungus was previously virulent.

Heimburger (C.) & McCallum (A. W.). **Balsam Fir butt rot in relation to some site factors.**—*Pulp Pap.* (*Mag.*) *Can.*, xli, 4, pp. 301–303, 1940.

The frequency and intensity of butt rot in balsam firs (*Abies balsamea*) caused by *Poria subacida* (feather rot) and *Polyporus balsameus* (brown rot) [*R.A.M.*, viii, p. 412] and in white and black spruce [*Picea glauca* and *P. marina*] (*Poria subacida*, *Polyporus balsameus*, *P. schweinitzii*, *P. circinatus* [ibid., ix, pp. 148, 628], or *Fomes pini*) were studied in two site types in the Boreal Region of Quebec, namely, softwood flats (*Cornus* ground vegetation) and mixed wood slopes (*Aster*), and found to be heavier in the latter. Thus, *P. balsameus* was found on *Abies balsamea* in 42 per cent. of the *Cornus* and in 61·4 per cent. of the *Aster* plots. The various black spruce rots occurred on 88·4 per cent. of the *Cornus* and 70·7 per cent. of the *Aster* plots, but *Poria subacida* is less widely distributed on the latter, though more severe. In white spruce the rots were observed on 27·4 per cent. of the *Cornus* and on 34·6 per cent. of the *Aster* plots. Butt rot is a much greater problem in a dry than in a cool, moist climate, where the balsam fir flourishes.

Buchanan (T. S.). **Fungi causing decay in wind-thrown northwest conifers.**—*J. For.*, xxxviii, 3, pp. 276–281, 1940.

During one or more of the years 1926, 1929, and 1936, examinations were made of Douglas fir (*Pseudotsuga taxifolia*), Sitka spruce (*Picea sitchensis*), western hemlock (*Tsuga heterophylla*), western red cedar (*Thuja plicata*), and silver fir (*Abies amabilis*), blown down on the Olympic Peninsula of Washington in 1921. Of the 21 wood-destroying fungi of which sporophores were found on the various trees, 17 caused appreciable decay. Generally speaking, the sporophores of the different fungi were formed with equal facility on all the trees except *T. plicata*, the only important damage to which was caused by *Polyporus cuneatus* [*R.A.M.*, xix, p. 315]. *Fomes applanatus* [*Ganoderma applanatum*] was the most active pathogen of Douglas fir, *Tsuga heterophylla*, and *A. amabilis*, while *Picea sitchensis* suffered chiefly from *F. pinicola*. At the last inspection *F. pinicola* and *G. applanatum* were present in over 85 per cent. of the decayed volume of *P. sitchensis* and Douglas fir, respectively. Other fungi represented in the material included *Armillaria mellea* on *P. sitchensis*, Douglas fir, and *T. heterophylla*, *F. annosus* on the same and *Abies amabilis*, *F. putearius* and *F. roseus* on Douglas fir, *G. oregonense* [loc. cit.], *Lenzites sepiaria*, and *Polyporus* [*Polystictus*] *abietinus* on all except *Thuja plicata*, *Polyporus fibrillosus* on *Picea sitchensis*, Douglas fir, and *Tsuga heterophylla* (trace), *P. sulphureus* on Douglas fir, and *P.* [*Polystictus*] *versicolor* on all.

Davis (W. C.), Young (G. Y.), & Orr (L. W.). **Needle droop of Pine.**—*J. For.*, xxxvii, 11, pp. 884–887, 1 fig., 1939.

Needle droop of red pine (*Pinus resinosa*) was first observed in the Lake States of Minnesota, Wisconsin, and Michigan in 1935, and also occurred in Maryland in 1936 and in Massachusetts in 1937. Considerable damage was caused by the premature loss of most of the affected needles, which bent over more or less sharply about ¼ in. from the base;

those remaining alive usually showed lesions accompanied by resin deposits at the point of constriction, and did not regain their normal erect position. In the Chippewa National Forest about 80 per cent. of the trees were injured over an area of 200 acres, all sizes up to 20 ft. in height being involved, though the symptoms were most severe in those under 6 ft. On the Red Lake Indian Reservation 50 to 60 per cent. of the trees were attacked and 40 per cent. killed by the disorder, which is tentatively attributed, in the absence of insects or other micro-organisms, to abnormal physiological factors, such as might be associated, for instance, with the temporary drought following exceptionally rapid growth in the wet early summer of 1915. Droop symptoms were induced on 5 out of 14 three-year-old red pine seedlings in a greenhouse at 90° to 100° F. by withholding water for 20 days and then resuming normal watering.

BARRETT (J.). **Timber salvage from Douglas Fir trees infected with conk rot (Trametes pini).**—*J. For.*, xxxvii, 7, pp. 577–578, 1939.

The results of a study made in the Pacific North-west to determine the profitability of timber salvage from Douglas firs [*Pseudotsuga taxifolia*] infected by conk rot (*Trametes* [or *Fomes*] *pini*) [*R.A.M.*, xviii, p. 644] indicated that heavily infected trees, i.e., those on which conks appear within 20 or 30 ft. from the ground and continue upwards to the top, should not be cut, but that good footage may be expected from cases of milder attack. Of the 1,057,376 ft. cut in the course of these investigations, 386,112 ft. (38 per cent.) was infected by *F. pini* and 203,848 ft. (53 per cent. of the infected) rejected as worthless for the purpose in view.

HUBERT (E. E.). **A method of substituting Pine sapwood for malt agar in culturing test fungi.**—*Science*, N.S., xci, 2358, pp. 247–248, 1 fig., 1940.

Ponderosa pine [*Pinus ponderosa*] sapwood was successfully substituted for malt agar in culturing wood-rotting and sap-staining fungi used in testing the toxicity of wood preservatives. The method is described as follows: inside a half-gallon, square, wide-mouthed, screw-capped Kerr jar laid on its side, two pieces of sapwood, $\frac{1}{4}$ by $2\frac{3}{4}$ by $6\frac{1}{8}$ in., are placed on a grooved strip of sapwood in such a manner as to form a V-shaped trough, at the bottom of which a glass tube is placed. About 100 c.c. water is added and a pad of cotton wool placed in the cap, which is loosely screwed down. After sterilizing the jar and contents the fungus inoculum is deposited at various points on the two boards and when the required growth has been obtained moistened pine test pieces, $\frac{1}{4}$ by $1\frac{1}{2}$ by 2 in. (8 to 10 at a time) are placed over the fungus mat, their lower edges resting on the glass tube. This method is stated to provide a much greater capacity for test pieces than the Kolle flask and to be more economical in time and cost.

ZYCHA (H.). **Einfluß von Nährsalzen auf den Holzabbau durch Pilze.** [The influence of nutrient salts on the fungal disintegration of wood.]—*Holz Roh- u. Werkstoff*, iii, 2, pp. 50–52, 2 figs., 1940.

Laboratory experiments were carried out at the Hann.-Münden

Institute of Forest Botany to determine the influence of nitrogenous salts on the disintegration of spruce wood (used for indoor constructional purposes) by *Coniophora cerebella* [*C. puteana*] and *Paxillus acheruntius* [*P. panuoides*: *R.A.M.*, xviii, p. 426], pure cultures of which were inoculated into wooden sticks semi-embedded in dry clay (commonly used as a filler in ceilings) in flasks moistened with varying quantitites of three nitrogenous salts in 25 c.c. water. After three to four months the losses (in percentages of the initial weight of the kiln-dried wood) were as follows: (1) *C. puteana*: control 22, calcium nitrate 0·47, 1·09, and 3·59 gm. per kg., 22, 22, and 22, respectively; potassium nitrate 0·16 and 0·47 gm., 26 and 30, respectively; ammonium sulphate 0·78 and 1·56 gm., 50 and 54, respectively. (2) *P. panuoides* (quantities of salts as for *C. puteana*): control 16; calcium nitrate 35, 48, and 7, respectively; potassium nitrate 32 and 43, respectively; ammonium sulphate 47 and 33, respectively.

It is concluded from these data that clay (which in itself exerts no deleterious influence on the durability of wood) may safely be used as a filler if taken from a suitable source—preferably from uncultivated soils or from the subsoils of cultivated ground, which have total nitrogen contents of only 0·2 and 0·6 gm. per kg., respectively, as compared with 1·2 for the upper layers of soil in cultivation. Sand or slack may also be used with advantage.

Lehtinen (E.). **Timmerbevattningsmetoden.** [The timber spraying method.]—*Papp. Trävarutidskr. Finl.*, xxi, 23–24, pp. 816–818, 820, 7 figs., 1939.

This is an account of the Runbäck method of spraying wood (floating or dry) for the prevention of blueing [*Phialophora fastigiata* and *Pullularia pullulans*: *R.A.M.*, xvi, p. 575; xviii, p. 774], which is stated to be almost universally applied in the timber industry throughout Sweden.

Chronique forestière. Poteaux télégraphiques. Pour augmenter la durabilité des poteaux télégraphiques et téléphoniques. [Forestry notes. Telegraph poles. To increase the durability of telegraph and telephone poles.]—*Bull. Soc. for. Belg.*, xlvii, pp. 142–144, 1940.

In the first of these notes it is stated that taking an average of 18 European countries the proportions of the different timbers used for telegraph poles are 76 per cent. Scots pine [*Pinus sylvestris*], 18 per cent. fir, and 2 per cent. each for larch, oak, and chestnut. Of the preservatives used, coal tar oil, mercuric chloride, copper sulphate, U salts (UA basilite, U thanalith) [*R.A.M.*, xix, p. 249], and 'various' were applied, respectively, to 67, 11·8, 15·9, 3·1, and 0·2 of the trees, and gave, respectively, 26, 18, 21, 12, and 12 years' protection from decay. Untreated trees numbered 2 per cent., and lasted 9·5 years.

The second note is an abstract in popular terms of a paper already noticed [ibid., xix, p. 181].

Van Wyk (J. H.) & Loseby (P. J. A.). **The preservation of wood.**—*J. S. Afr. For. Ass., 1939*, 2, pp. 11–30, 3 pl., 2 diags., 1939.

This is a useful survey of the practical, technical, and economic aspects of timber preservation in South Africa [*R.A.M.*, xvi, pp. 788,

789], where the following preparations have been found most suitable: creosote (used at a minimum absorption of 5 lb. (½ gall.) per cu. ft. for *Eucalyptus* spp. and at a somewhat heavier rate for pine wood); fuel oil, the chief value of which is as a diluent for creosote or other preservatives, its only independent property being a waterproofing action tending to keep the wood below the moisture content required for fungal development; zinc chloride (in solutions up to 5 per cent., used at a minimum rate of ½ lb. dry salt per cu. ft.); a mixture of 1 per cent. arsenious oxide and 3 per cent. zinc chloride; and zinc sulphate, largely employed for the treatment of mine timber in the Witwatersrand area, where the salt is obtained as a cheap by-product of the gold extraction process. Full directions are given for the application of both the superficial and impregnating processes, the former comprising brush treatment, dipping, and spraying, and the latter pressure, non-pressure, steeping, open-tank, and farmers' plants. Lists are given of durable and non-durable, indigenous and exotic woods. The average life of an untreated pole is about three years compared with approximately 20 years for one treated with creosote.

[An Afrikaans version of this paper appears in *J. S. Afr. For. Ass.*, *1939*, 3, pp. 82–99, 3 pl., 3 diags., 1939.]

Birkinshaw (J. H.) & Findlay (W. P. K.). **Biochemistry of the wood-rotting fungi. Metabolic products of Lentinus lepideus Fr.**—*Biochem. J.*, xxxiv, 1, pp. 82–88, 1940.

This is a detailed account of the technique and results of the authors' studies on the metabolic products of *Lentinus lepideus* from Scots pine [*Pinus sylvestris*], the outcome of which has already been noticed from another source [*R.A.M.*, xix, p. 377].

Erdmann (W.). **Holzschutz gegen Fäulnis in Gebäuden.** [Timber protection against decay in buildings.]—*Z. Ver. dtsch. Ing.*, lxxxiii, 22, pp. 685–687, 7 diags., 1939.

This paper summarizes the constructional precautions and chemical treatments to be employed in Germany against the very prevalent domestic wood-destroying fungi, *Coniophora cerebella* [*C. puteana*], *Merulius lacrymans*, and *Polyporus vaporarius* [*Poria vaporaria*, to which *P. vaillantii* is commonly referred: *R.A.M.*, xviii, p. 76].

Legislative and administrative measures.—*Int. Bull. Pl. Prot.*, xiv, 3, pp. 58, 60, 1940.

Jamaica. Law No. 21 of 19th June, 1939, to be cited as the Banana (Leaf Spot Control) Law 1939, provides assistance for the treatment of bananas against *Cercospora musae*.

Réunion. The importation into Réunion and the circulation, warehousing, and transit in the island of cassava plants, cuttings, and seeds from whatever country is prohibited (as a safeguard against mosaic) by a Decree of the Minister for the Colonies dated 5th February, 1940. Exceptions may be granted in special cases only, and provided that the plants are accompanied by an official health certificate from the country of origin. Each lot admitted will be grown in quarantine for 15 months, and its subsequent cultivation controlled.